



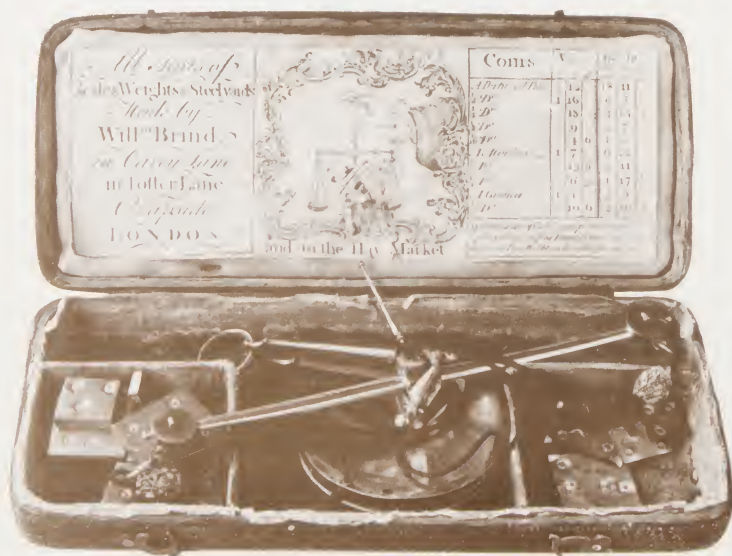
EQUILIBRIUM

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

SPRING, 1980

M.A. CRAWFORTH, EDITOR

PAGES 205-232





EDITOR'S COMMENT

Partial history

How fortunate for us today, that scalemakers of the 17th and 18th centuries made coin scales, because it is from the labels in their boxes that we know of the scalemaker's business and of their names. Labels formed the starting point for research and enabled us to find a great deal of information in old records. But without those labels the opportunity for research would have been almost nil, and Diana's article about London scalemakers (page 207) would have been impossible.

If those old scalemakers could see our records today, they would be very surprised to find such a detailed picture of their activities; to find that we know them only from coin scales, which must have been a very small part of their trade. So many men could not have made a stable living from coin scales alone, for public demand illustrated far too much. Surely, scalemakers earned their daily bread then, as today, by making, selling and repairing scales for commercial use, for butchers, bakers, grocers, tea merchants, coal dealers, and many other traders. This major part of their business was advertised on their labels, "Makes and sells all sorts of scales, weights and stilliards. Shopkeeper's scales &c. kept in repair by the year."

What had happened to the many thousands of trade scales that were made? Were they sold, unmarked with the maker's name, to survive in unrecognised anonymity? Were they supplanted by weights and measures inspectors in the 19th century? Have they all been destroyed?



COVER PICTURE

Coin scales by William Brind M1751 - L1774*. This striking pocket set has a fine steel head and unusually large round box ends. The green silk cords finish in large silver cord balls, which lie, with the gleaming brass pans, on cherry-red velvet. A white label is stuck on to the vivid pink silk in the lid. This glowing interior contrasts with the sober black shagreen exterior.

Gold coins circulating in England at this date were the Portugal Piece and Moidore, as well as the English Guinea, so the label specified the value and weight in pennyweights and grains. Brind supplied 6,5,4,3,2, & 1 pennyweights and 6,5,4,3,2, & 1 grain weights. His sign, The Hand and Scales, would have hung outside his shop.

* E - L The earliest and latest dates so far discovered.

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

Bob Stein, Chairman	20 North Wacker Drive, Chicago, IL, 60606 U.S.A.
Michael Crawforth, Vice Chairman	31 Park Lea, Sunderland SR3 3TA England
Albert Eaches, Vice Chairman/Treasurer	R.D.3, Box 241, Phoenixville, PA 19460 U.S.A.

©1980 International Society of Antique Scale Collectors

Symposium '79

PAPER PRESENTED
BY D.F.CRAWFORTH



LONDON SCALEMAKERS (Part 1)

The Transmission of Scalemaking Knowledge from 1632 - 1800

Most collectors have scale boxes with the maker's names and addresses, but are unable to relate that information to any other historical facts. In examining our labels, a number of questions arose, and we decided to attempt to solve them, starting with the most basic questions posed by each label:



Who was Thomas Croome? When did he live? Who taught him to make scales? Who did he know? Where was Cow Lane?

We started by obtaining copies of 18th century maps of London to show, visually, the positions of Scalemakers. We indicated each address known in the appropriate street, and discovered that scalemakers tended to be located in fairly dense groups, these groups being near major market sites in London. One extremely important market was at West Smithfield where Thomas Croome lived, and where he had many scale-making neighbours. Which of them were his contemporaries?

To answer this question, we started an index of the London streets to identify neighbours; at first geographically only, but eventually, by date as well. Here is an example showing a street about a quarter of a mile east of Cow Lane. ➤

ST. ANN'S LANE.

Hammer and Crown
Hammer and Crown
Angel and Star
Angel and Star
Hand and Scales
Angel and King's Arms
Golden Borele
At the corner

Samuel Neale
Henry Neale
Edmund Jenks
John Neale
William Taylor
Samuel Read
John Deane
Charles DeGrave

Because English coin scales were not dated by their makers, we analysed the style of each scale and its box. Thus we noted on a scale by Thos. & Eliza. Hux, Fig 2, that the pearwood box was cut from solid (CFS); that the beam was square in section at the middle and pentagonal at the 'wrists', with swan neck ends; that the pointer had a decorative hole in it; that the ornate weights were for the Louis d'or, pistole, guinea and their subdivisions; that the wood-cut label was ornate; that the shop had a sign but no street number; and that the label was subsequently used by Elizabeth Lamb, with only the name changed.



FIG 1.



FIG 2.

At first we had no difficulty work to ascertain when each coin was current in England, as numismatists knew only to be interested in the minting date for their coins, and to know little of their pattern of usage, or circulation range, and of the common man, or of their withdrawal from circulation. So many fascinating questions arose. Why were Portuguese coins allowed in England? Why French coins? Why guineas of different weights? Looking at James Sangster's scales, Fig 6, surely we ought to be able to date them from the coins listed?

So many questions! So many pictures in our imaginations! Think of Adam Smith, Fig 3, borrowing from John Neale, Fig 1. Picture John Kirk browsing among the books in St. Paul's Churchyard. Imagine Robert Wincott defying the traffic jams on London Bridge.... Imagination is very rich, BUT we wanted facts. Were many scales made in London? Did styles change? Were many owner in the business?

We consulted Rate books, Poll Tax records, Fire insurance lists, Baptismal records, Marriage lines, Probate records and Trade directories. Eventually we found a reference to "Samuel Read, Citizen and Blacksmith" Fig 12. We ascertained that when Citizen was written with a capital letter, it meant that he was a Freeman of the City of London, free to practise his trade; that Blacksmith meant that he was a member of the Blacksmith's Livery Company (Guild), and that the Blacksmith's Company records had survived! ➤

* See Part 2.



The map shows some of the main areas where scalemakers were grouped together near centres of commercial activity. There were many similar groups in other areas, as in the major thoroughfares of London Bridge and Bishopsgate, in markets like Cheapside and Poultry, and near financial centres like the Royal Exchange and the Bank of England. As the index to St. Ann's Lane shows (p 207), many of the premises were used successively by scalemakers over several generations.

While searching the Blacksmith Company records for a reference to Samuel Read, we found a name we recognized from a label - that of John Picard. Here is that brief entry :

"January, 1698.

John Picard, son Joseph of Cowley, pinner, to John Smart."



Immediately, we see some facts to work on. John Picard was a young man from Cowley, in Oxfordshire, who went fifty-six miles to London for his training. Although his father was a gentleman, he was apprenticed to a scalemaker, John Smart, Fig 3. Incidentally, the entry also showed that John Smart was an established master scalemaker by 1698.

To answer to almost all our questions, except the numismatic ones, were buried in these London records. We had struck gold !



FIG 3.



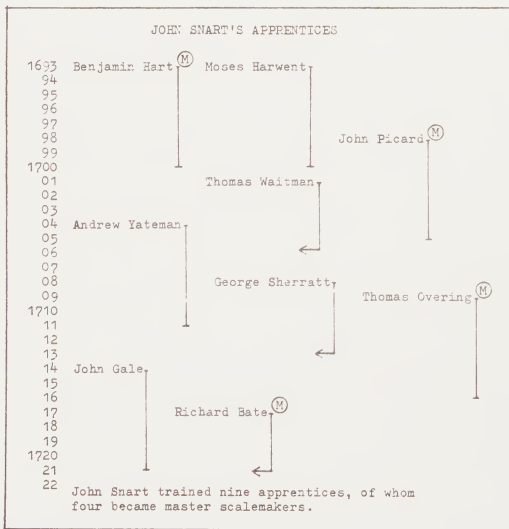
FIG 4.

We found it necessary to learn about apprentices. In England, they were bound to their masters when about fourteen years old, usually for a period of seven years, and were only allowed to become a master if they made a sufficiently good masterpiece, and had enough money to start a business. Apprentice training was controlled by a Guild, or Livery Company, but there was no scalemaker's Guild, so they joined other Livery Companies, of various trades. But who controlled the standard of scalemaking in these Guilds ? What sort of life did an apprentice scalemaker experience ?

The entries we wanted were buried among thousands of references to other apprentices who joined the Blacksmith's Company. None were identified by their trade, so we could only collect those names we knew. These entries led us to new people who had trained "our" makers, or to new people who had been apprenticed to "our" makers. Before we accepted an unknown maker as valid, we decided it was necessary to have two references to him which both directly connected him with two master scalemakers whom we had identified from scale labels or trade directories.

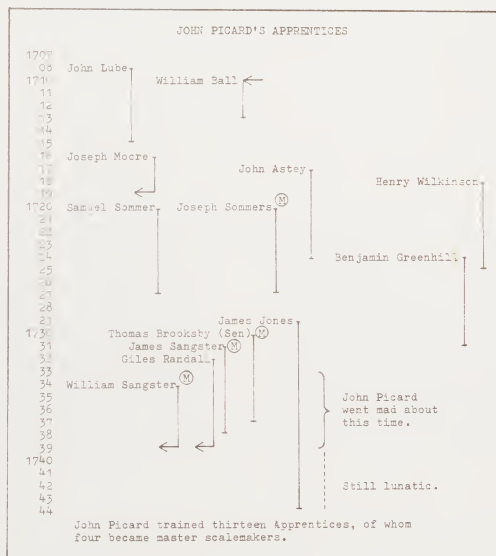
All the relevant entries were cross referred in our files, but only proven scalemakers were used for our deductions and conclusions. We considered that we had found an unknown master scalemaker if we had references to him as a proven maker training apprentices. (We had proof of the efficacy of this system when we cross-linked Phillip Poussett twice - when he was bound to Joseph Sommers, and when he had one of his apprentices turned over to William Brind, see Cover Picture. We had never heard of Poussett before, but this year we found a scale made by him !).

To return to that first discovery, the entry on John Picard. There were about seventy items of information buried in the Blacksmith's Company records, on him alone. So what light did they throw on his life, his training and his work ? We made diagrams of the known facts. ➤



John Picard had to contend with two experienced apprentices, when he went into Mr. Snart's workshop as a raw lad from the country. One of these apprentices, Benjamin Hart, must have found him a great ignoramus - after all, Benjamin had grown up watching his father, Joseph Hart, make scales, and had observed his father training John Snart !

But John Picard became the senior lad in 1700, and Mr. Snart took another apprentice, so John could show his superiority. He was freed after the customary seven years, and set up his own business in the same small road, Maiden Lane, at the corner with Wood Street. Presumably, John Picard kept in contact with John Snart, so he would have met subsequent apprentices Thomas Overing, (Part 2 Fig 11) and Richard Bate, who also became masters.



John Picard started to train an apprentice only three years after he had finished his own training, and took on a partly-trained apprentice soon afterwards. From that time on, he was never entirely without an apprentice to help him, and, for most of his working life, he had four or five apprentices. This implies a large workshop and a sound business with plenty of trade, as he would not have committed himself to their

training unless he anticipated being able to fulfil his obligations for the following seven years. And he had James Jones apprenticed for fifteen years ! This was by no means unique, but we cannot deduce the reason for so long a training.

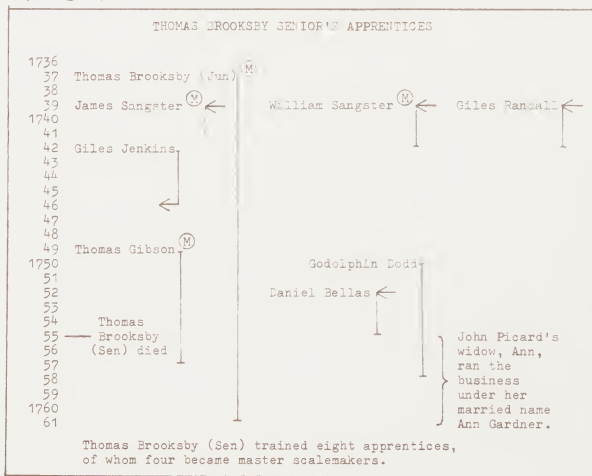
For at least twenty-six years John Picard ran a thriving concern, and, at some point, married Ann. Later, his wife must have had a hard time with him when he went mad, between 1734 and 1737, as poor John had to be incarcerated in the Bethlehem Hospital for the Insane (Bedlam), apparently for the rest of his life. We found records implying the tragedy :

"1737, Thomas Brooksby freed by consent of Ann Picard, John Picard being lunatic in Bedlam. "

"1741, Giles Randall freed with the consent of Ann Pickard (sic), master being lunatic, on testimony of Thomas Brooksby, Successor to his late master."

Ann, his wife, had taken over the legal responsibility for training his apprentices, although we have no evidence that she considered herself anyone other than a trustee of her husband's business. (We have found no labels printed with her own name, although we have for some widows). Thomas Brooksby (senior) had done the actual training of Giles, and it was he who testified to the high standard of Giles' workmanship.

Thomas Brooksby ran the business while John Picard was in Bedlam, having been trained from 1730 to 1737, but he was not so conventional as might appear. Look at the apprenticeship of his son, Thomas Brooksby (junior), Fig 5, and look at the dates. Thomas (senior) took his son



as apprentice in 1737, so his son must have been born about 1723. Thus Thomas (senior) married before that date, and was himself born before 1700 (in Filton, Gloucestershire). Consequently, he must have been a married apprentice of mature years. Interesting, and the only one we know of.

And look at how long his son, Thomas (junior), was kept as an apprentice - twenty-four years ! Was this a legal oversight, or was this genuine bondage ? It must have been especially aggravating for Thomas (junior), as he had to watch his father's other apprentices freed and setting up their own businesses while he was still bound. William and James Saenger, Fig 5, and Thomas Gibson, Fig 7, all worked with him as apprentices, were freed before him, and all have left beautiful fine examples as evidence of the excellence of their training.



FIG 5.



FIG 6.

Thomas Brooksby (senior) died in 1755, but his son was subordinate to John Picard's widow, Ann, until she died or retired, by 1761. She had remarried, to a Mr. Gardner, after poor Ned John died, but she continued her legal responsibilities until about 1760. She freed Thomas Gibson in 1757, and ultimately Thomas Gibson freed Thomas Brooksby (junior) in 1761.

At last, freedom ! He must have felt overlooked for an inordinate time, but at last he had control. He ran the business, but for so short a period, only nine years. Not long to be a master after so long a wait.

Thomas Gibson, Fig 7, then took over the business - and took over his widow !

"1770, John Wheatley, bound to Thos. Brooksby, deceased, turned over to William Brind, with the consent of Thos. Gibson, he being the husband of Elizabeth, widow of the said Thos. Brooksby."

What had been going on behind the back of poor Thomas Brooksby (junior) ? Was he imposed upon by everybody in his life ? Or was his widow making a wise decision, marrying a man she knew well, who knew that particular business, and was qualified to continue it ? Elizabeth could scarcely



FIG 7.



FIG 8.

foresee that her second husband would be dead within seven years, and that she would have to take over the business herself.

However, the business was too much for her. After three years she formed a partnership with Charles Sommers, Fig 8, from Walbrook, five blocks away. Gibson & Sommers lasted until Elizabeth Gibson's death in 1783. Charles had already trained his own son, Joseph (2nd), to be a master scalemaker, but he did not take him into partnership until 1792, as Sommers & Son. Charles lived to be an old man of at least seventy-four, but he died in 1807, leaving Joseph to run the business alone for five years. Joseph was himself in his fifties by this time, so maybe he was planning for the future when he took a partner in 1802, and ran the firm as Sommers & Stanley until 1806.

The business had two partners for so many years that it must have been a thriving concern, with good profits and optimistic investors. Because so many people were involved, a chart was needed to clarify the sequence.

We were delighted to trace a continuous line of ownership, line of responsibility, and also to show the place of women in the industry. Through the curt lines of the Blacksmith's Company records, a living picture was slowly building up.

PART 2 of Diane's article will appear in the next issue of BQM.



It would help our research immensely if members would send us the maker's name and address, or initials, from any English scales of the 17th and 18th centuries in their collection.

Diane & Michael Crawforth.



NOTES & QUERIES

NQ 32. WEIGHT FOR THE NOBLE

query from A.G.Mallis.



I have a hexagonal coin weight of 6.6 grams, which was dated in the catalogue as 1600 - 1650 AD, for the Noble. The weight is 102 grains in the English system, but what bothers me is the fact that Nobles of Henry V and Henry VI were the only ones of 108 grains, and both of them reigned before 1600. Could this weight date back to the mid 1450's ?

REPLY

from the Editor.

Coin weights for the Noble are known to have been made from 1405. The coin itself, was last minted in 1464, and was replaced by the Rose Noble. (An excellent reference is in Gerard Houben's book, EQM p 66).

It was common for coins to continue in circulation for a great many years, often long after the death of the Monarch in whose reign they originated. It was, therefore, quite normal for new weights to be made for coins which had been made during a previous reign. Well documented, are the round weights made by Briot on the order of Charles I. In 1632, he made signed weights for the coins of James I, who had died in 1625. Further weights for these coins were made for many decades afterwards, and the coins themselves, were not officially withdrawn until the 18th century. Consequently, the dating of an isolated coin weight is almost impossible, unless it has some significant mark, such as the maker's initials.

Richard Turner, a noted authority on English coin weights, shows hexagonal weights from the reigns of Henry IV (1399-1413), Henry VI (1422-1461), and Edward IV (1461-1483). He notes that the reverse side of the weights was blank until "...the reign of Henry VIII(1509-1547), when the value of the coin represented, appeared on the reverse side of the weight, and this became the usual practice for all future ones."

It is interesting to see that your weight is 6 grains under the weight of a new Noble. This may well have been an allowance for wear - the least current weight - which was the amount, 6 grains, commonly allowed in the 18th century, up to 1774.

NQ 33. COMPUTING SCALE CO (NQ 26).

reply from T.S.Carley

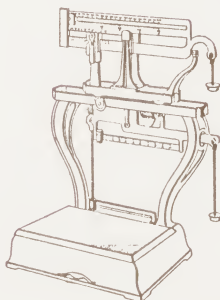
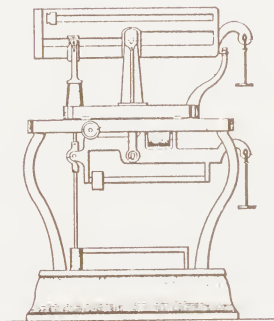
I have three Computing Scale Co. scales, each a different type :-

1. Marked 'The Computing Scale Co. Dayton, Ohio, USA. Style No. 167.'
Capacity 5 lb. Serial No. 504989.

Patents	648289	April 24, 1900
	728418	May 19, 1903
	816093	March 27, 1906

2. Marked 'The Computing Scale Co. Serial No. 52199.

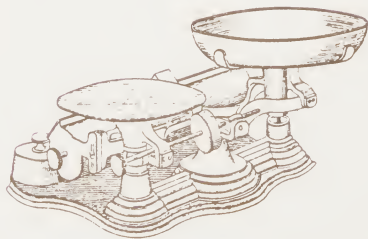
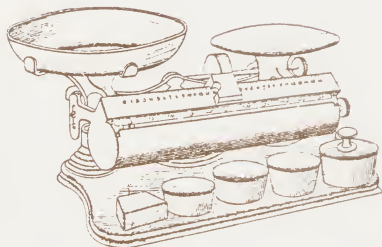
Patents	314717	Mar. 31, 1885	486663	Nov. 22, 1892
	356077	Jan. 11, 1887	486695	Nov. 22, 1892
	385005	Jun. 26, 1888	506793	Oct. 17, 1893
	451075	Apr. 28, 1891		



Drawing from Patent No. 486663, 1892, by J.W.Culmer.

3. Marked 'The Computing Scale Co. Serial No. 61786.

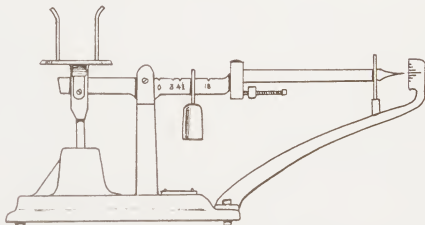
Patents	514475	Feb. 13, 1897	581173	Apr. 20, 1897
	581172	Apr. 20, 1897	608441	Aug. 2, 1898



Drawings from Patent No. 581172, 1897, by O.O.Ozias.

Although my scale is marked with this patent, it does not have the computing cylinder. Also, the patent does not show the large brass pointers which are fitted to my example. So, I think that, maybe, they made two models - I'll probably never know. My weights are identical to those shown in the patent.

Your scales were for testing the moisture content of butter. It was made on the same cast iron frame that Fairbanks used for a wide variety of scales, from postal to grain testing. I have one of the latter, and I find it lacks sensitivity.

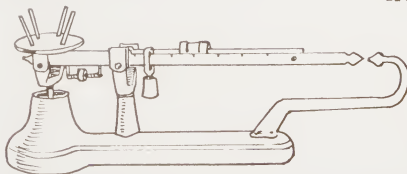


In contrast, the refinements on my butter scale, above, are marked. It has four agate bearings, two adjustable feet, two right-angle levels, a longer beam with vernier readings, a tare adjustment and a fine balancing adjustment. It is sensitive to 20mg.

The Fairbanks catalogue No.59 of 1915, section K, describes a similar scale, which was discontinued shortly after the catalogue was published.

Here is an extract :-

from T.S.Carley.



"The percentage of moisture in butter is a factor, requiring the careful attention of every creamery man. It is well known that the making of dry butter produces a very definite loss and this loss can be easily prevented through measuring the actual percentage of moisture in the butter. On the other hand, it is desirable to avoid a larger percentage of moisture than that specified in the pure food laws.

To enable the percentage of water to be easily and accurately determined the Fairbanks Butter Moisture Test Scale offers special advantage. The scale as shown above, has a metal pan with prongs to hold a cup and is fitted with a special beam, weight and poises, to be used according to the simple, definite instructions furnished.

The method is to carefully take a sample of butter and after tare has been taken on the cup, to balance a certain amount of the sample on the scale. The cup with its contents is then heated and returned to the scale where a new balance gives at once the correct percentage of moisture in the butter from which the sample was taken.

The scale is durably and attractively finished in white with nickel-plated pan, beam, poises and indicating arm. It may also be used for the Babcock Test."

The scale was used to test milk for its butter-fat content, in the Babcock Test. I have one of these scales, complete with some of the test bottles which fitted on the pan between the pins.

from A.S.Hall.

NQ 35. TREATMENT FOR RUST

query from H.L.Daneman.

What is the recommended procedure for treating rusted scales and weights ? Also, does one use any coating at all to prevent further deterioration ?

COMMENT

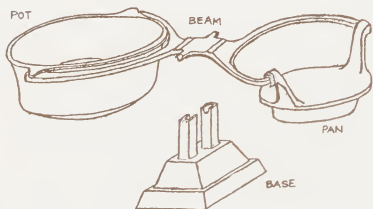
from the Editor

I use phosphoric acid rust converters, Jenolite, Naval Jelly, (turn the rust blue-black), a biological rust consumer, Biox, (leaves the metal pitted where the rust was), and plain hard work with a wire brush and fine emery cloth, (leaves me exhausted !). They all cope tolerably well in different ways, with rust removal, if you are thorough. Subsequent protection is a great problem. I have experimented with moisture displacing oil sprays, waxing and clear lacquering. None of them are entirely satisfactory.

CAN ANYONE HELP ?

NQ 36. MYSTERY SCALE

query from A.S.Hall.

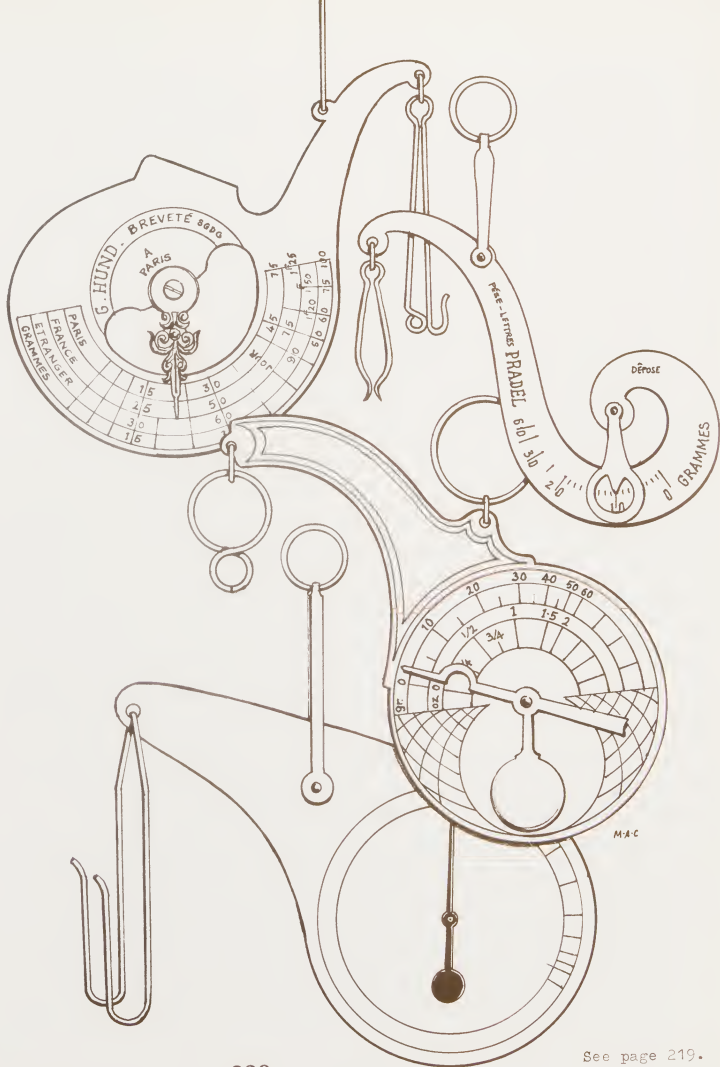


I wonder if someone could help me identify this scale ? The four parts are all of cast iron. The knife edges are cast integrally with the beam and the bearing surfaces are cast in the base, pot and pan. Overall length of the scale is about 15 inches (380mm), and there are no marks of any kind. The scale is more graceful and pleasing in appearance than my sketch indicates.



VARIATIONS ON A THEME

In the last issue of EQM, page 199, a variety of English balances were illustrated, which were made to Hall's patent of 1863. European makers used the same principle of an enlarged end on the beam carrying the graduations, and a pendulous pointer. In the drawing on page 220, the first three are all French, the third one being pure silver. It was made by Christofle of Paris, in 1975, and was sold in an exclusive London shop for modern use. The fourth example comes from a drawing in a German book, and more information is not available. The scale is unusual because it has a clock-like pointer, and a wire letter rack instead of the usual spring clip. Could there be more variations ? ➤



Newsletter

FIRST CIRCULATED IN 1977.



COLLECTING ADVENTURES

BY F. AND M. WORMSER.

Frances and I have had many happy times, interesting adventures and, best of all, met many friends in collecting our scales and weights.

Many times I have been asked "Why collect scales and weights?". I must be quite candid - it was not because of my interest in one of the first needs of civilization, namely, measuring or the science of metrology. Possibly, it was because for a quarter of a century I received daily reminders of the importance of accurate scales.* Being in the coal industry I was constantly aware of our fleet of trucks travelling over platform scales at our yards. On the other hand, the many decorative uses to which a great variety of scales can be put, was also a contributing factor. My best (?) friend always said I started to collect due to my fear of being swindled - not so !

My first acquisition, in 1947, was a very ordinary postal scale on a mahogany base, which I espied in an antique shop. I thought it would adorn my living room. The dealer refused my offer for the scale, but after two months of dickering we compromised at a price which, by the way, was his original one !

It was ten years before a second item was added - what a wasted opportunity. In that period we travelled hither and thither, and even went on a World tour. We did, however, continually visit antique shops, flea markets, and all such spots.

From 1957 onwards, we began to pick up one scale after another, as well as weights. We were not very discriminating in the beginning, and now we have accumulated approximately 400 items, of which about 10% are weights.

After one of our trips abroad, we returned via New York. The trip had netted a dozen "new finds" from Denmark, France, Switzerland and England. Noting the customs officer's perplexed study of the unusual declaration, and not wanting to be classified as a dealer, I said "You know I'm a collector of antique scales". The officer paused for a long moment, wagged his head in disbelief, and replied "Well, now I've heard everything." He gave me an affidavit to sign testifying as to the vintage of the items which had been purchased as antiques. This I did. Then the officer, acknowledging that he knew nothing about such things, said he thought he ought to examine at least one. So, he poked through the wrapping paper covering a person scale, Fig 9. By doing so, the slit in the paper happened to reveal the date 1730. He was satisfied, and we left the pier without paying duty. However, the officer never saw the 'EST.' alongside the date ! ➤

* See 'Caught Short', by Morton Wormser, EQM page 32.

Originally, I did some advertising for scales and was fairly successful. For the most part, the answers came from individuals who were not collectors, but who had an old scale lying around. In fact, through this medium I also acquired several pen pals. The first scale I obtained in this manner was from a lady in Michigan, Fig 1. It was a commodity scale, also known as a grain tester, made by the Buffalo Scale Company around the time of the American Civil War (1865).

At about this time, I met Bob Stein. He had seen an article 'Our Friend, the Scale Collector' in the monthly Toledo Scale Corporation magazine. The article came about because of a letter I had addressed to Toledo's president, enquiring for advice as to the best way to go about collecting their products. In reply I received pictures of all the scales in their assortment and, in addition, illustrated copies of a series of articles in Toledo News Bee, January 1935. These articles were entitled 'The Weigh of the World'. I immediately started a scrapbook which has since grown to immense proportions.

Bob Stein came to my office along with his beautiful catalogue depicting his scales in colour. My tongue hung out when I saw his postal 'ladder scale', which I had never seen before. Three years later, in the midst of a busy day, Frances called on at the office explaining exactly what she had just seen decorating a large department store window. "It must be a ladder scale," I immediately exclaimed, "I'm on my way to the store, don't let anyone remove it". That was the end of business for the day, and we finally acquired a ladder scale - one never knows where the next scale will appear. Had I not seen Bob's picture, I never would have known what Frances was describing.

Eventually, with Bob's colour catalogue in my mind, I became very industrious and spent three months photographing each item in my collection. Modestly, I can say the new catalogue is a gem!

Among other crazy scales, Frances and I were in Geneva, New York, hunting for you-know-what, when we saw a sign denoting Japanese antiques. On entering, I noticed an early Japanese balance, Fig 4. I remarked to the proprietor that I had only seen one other in my travels, saying I had purchased it at an auction the year before, in Williamsport, Pa. He bowed way over with due respect, and said, "Ah, yes - I was the person bidding against you".

I guess you have all seen the slogan of the Equitable Life Insurance company - 'Every man on the street is a customer.' I have adopted it, but inserted the word agent for customer. Many acquaintances call and tell me there is a scale here or there. On one such occasion, a friend in Vienna purchased for me a beautiful gold coin scale with weights complete, and with the original inscription on the inside of the lid.

One evening, I received a message from a friend that there was a gold scale for sale nearby. At 9:01 the next morning I was at the shop when it opened, but the item described had no interest. The enterprising proprietor blocked my way to the door, querying whether I was interested in other balances. My lukewarm answer resulted in his insisting that I go to his private office. There he pointed to a typical Rube Goldberg

contraption, and asked, "For what do you think that was used?". I was confussed, but it subsequently turned out to be a scale to weigh ration books during World War II, Fig 7. Agents of the government carried it around like a suitcase, to weigh the books, because it would have been impossible to count each individual stamp. If I hadn't got a letter of authentication from the manufacturer I certainly would have remained a disbeliever.

So many of these strange happenings have occurred, but one was responsible for my almost losing my scale collecting partner, Frances. The occasion involved a charming little model Viennese scale and dance card. Frances, in her wonderings shortly before Christmas, found one of these rare items. She made the purchase and hid it as a surprise to me from Santa Claus. A few days before Christmas, I also found one, and proudly strode into the house with it that evening - are any further comments necessary?

Among my scales, I think one of the most precious is an early Persian one. It consists of two equal-arm balances contained in an ornamental hand painted wooden case, along with a set of engraved octagonal brass weights. A similar scale is on display in the London Museum, in Lord Castlereigh's collection.

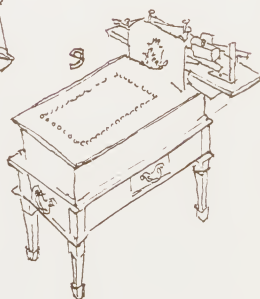
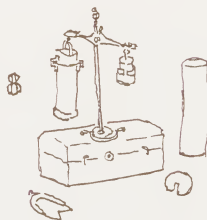
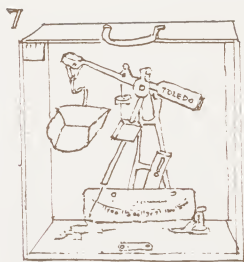
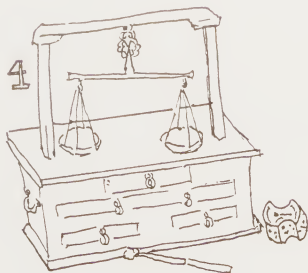
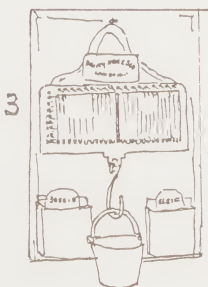
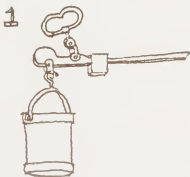
It has always been my custom, when in New York, to canvas all the shops on Second and Third Avenues, and I saw the Persian scale on one of these safaris. The beauty of the box, the elegant designs on the weights, and the attractive filigree decoration, inspired me to make an offer, but it was turned down. Frances thought it was beyond our economic capabilities. In spite of her view, I decided, a few weeks later, to make the purchase. Alas, the dealer told me the scale had been sold to a man in California. I raved and raged for months at the loss, but on Christmas day, it was under the tree. Consequently, our partnership is in fine shape again.

The above experiences proved the old collector's story, "One only regrets the objects not purchased, hardly ever the ones that were."

KEY TO THE ILLUSTRATIONS

DRAWINGS BY FRANCES WORMSER

1. Grain testing scale made by the Buffalo Scale Co. c1865. Brass. Beam length 11 inches (305mm), bucket $3\frac{1}{2}$ ins. dia. x 4 ins. (90 x 100mm)
2. Siamese iron weight with three elephant heads. The octagonal base is decorated with a line and star. Height $1\frac{1}{4}$ ins. (32mm).
3. Milk scale made by the Dairyman's Supply Co, Lansdown, Pa, USA. The central spring is attached to twenty sliding knobs on the face of the instrument. A graduated brass plate is attached to the left side, and two wooden pockets contain record cards for each cow. (The backboard and bucket are replacements). Height 20 ins. (508mm). ➤



3. (continued). The scale was used to record the milk yield from twenty cows. In operation, the bucket, full of milk, was placed on the scale hook. This load extended the scale spring and also pulled down the sprung knobs. The relevant record card was then inserted in a slot behind the knobs, and the knob marked with the cow's name was pushed in by hand, leaving an indentation on the card. The amount of milk could then be read from the graduations printed on the edge of the card.

4. Japanese scale with 12 Romme weights (violin shaped). The case is made of beautiful wood and has handsome bronze handles. Decorated brass pans adorn the scale, and a bamboo puddler is contained in the top drawer. Length of case, $29\frac{1}{2}$ ins. (750mm).

5. Tension tester by Geo. Salter & Co. West Bromwich, England. At the top of the mahogany board there is a form of spring balance (called a dynamometer), and at the bottom there is a hook attached to a screw and crank. Length 38 ins. (965mm).

This unusual instrument was used for testing the tensile strength of yarn. The thread was attached to the spring hook and to the crank hook, then the crank was turned to increase the tension. The indicator on the spring balance moves and registers the tensile strength when the yarn breaks.

6. Combined letter balance and call bell, made by Joseph & Edmund Ratcliff of Birmingham, England. Height $7\frac{1}{2}$ ins. (197mm). (I ring the bell occasionally to have someone take my letters to the post - so far, no one has appeared !).

7. Ration stamp scale made by the Toledo Scale Co. USA. Only a few of these counting scales were made, for the U.S. Government, in the 1940's. Height 17 ins. (430mm). The scale was used by agents of the O.P.A. to check ration stamps in retail stores, etc.

8. Grain scale made in Germany. Box length 11 ins. (279mm). (For full details, see EQM pages 51-53, Editor.).

9. Person scale made by W. & T. Avery in the 19th century. The brass beam and side beam are graduated in stones, pounds and ounces. It is a magnificent piece of furniture in the style of Hepplewhite. Height 20 ins, length $37\frac{3}{4}$ ins (508 x 952mm).



CONTEMPORARY COMMENT

About Chinese dot'tchins and their marks: "The dots are called 'stars', and the scale maker is termed a 'star fixer'. The steelyard maker perambulates the street and puts in little dots according to the preferences of each customer, who will have not less than two sets of balances, one for buying and one for selling. There are often many grades, and it is easy to confuse customers not up to small deceits and sinful games." The Reverend Arthur H. Smith, c1912.



REVIEW

WEIGHTS AND MEASURES

This excellent booklet has 53 photographs depicting nearly 200 weights and 24 measures. Weights illustrated range from those used by early civilizations to English weights of the last three centuries; beautiful examples of Elizabethan standards, a pie-shaped weight, wool weights, nesting weights, inspector's standards, a matching set of Avery pottery weights, and many others, but no ring weights or bar weights.

The text outlines the development of the Imperial system of weight and the relationship between Avoirdupois, Troy and Apothecary systems. It provides many useful tips for dating, discusses the various sizes and shapes of weights, their marks, and pitfalls a collector may encounter. The author writes with authority based upon professional experience as an officer of the Weights and Measures Administration, one-time Editor of their magazine, *Monthly Review*, and from a personal interest in the subject. It is all the more surprising that a few errors have been allowed to creep in. For example, Mr. Graham says, about nesting weights, "The largest weight should always be lidded". However, there is plenty of evidence, from documents and artifacts, that some nesting sets of the 17th, 18th and 19th centuries were made without lids. Also, the verification mark of the City of Westminster was a portcullis, and not, as the author states, a dagger, (the latter was a City of London mark).

A most useful and interesting booklet, which should be on the shelf of every scale and weight collector. Exceptionally good value for money.

'Weights and Measures' by J.T.Graham, published in 1979 by Shire Publications Ltd, Cromwell House, Church Street, Princes Risborough, Aylesbury, Bucks, England, HP17 9AJ. 32 pages, Price £0.75 plus P&P.

WEIGHTS IN PICTURES - GEWICHTEN IN BEELD

A booklet which must whet the appetites of all collectors of weights and scales. The eighteen full-page colour illustrations are as beautiful as they are informative, each one a thematic study - Dutch grain scales, weight standards of Brabant, 18th century money scales, metric weights, market scales from 1820, banker's weights, apothecary weights, nesting weights, standard weights of Amsterdam, French weights, baker's weights, pottery weights, and so on.

The text and captions are in Dutch (2½ pages), but it doesn't matter much if you cannot read it - the superb photographs are what you buy it for, and buy it you should !

'Gewichten in Beeld', 1977, is available from Mr. W.Hartong van Ark, Rondelaan 15, 1861 EC, Bergen (NH), The Netherlands. Price Dutch FL16.

GLOSSARY OF TERMS CONTINUED

DAMPER - a device used to reduce the number of oscillations of a scale beam, to hasten the process of weighing. One such device has a piston with a small hole through it, in a cylinder. When the piston is moved by the beam, the air flows slowly through the hole thus shortening the motion, Fig 26. Other devices include oil baths and magnetic damping. The damper has no effect upon the sensitivity*. Also called a DASHPOT.

DASHPOT - see DAMPER

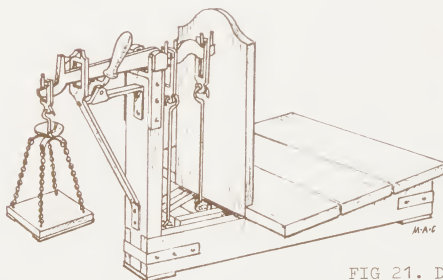


FIG 21. DECIMAL SCALE

DECIMAL SCALE - a compound lever scale* with a lever ratio* of 10 : 1. It was devised by Alois Quintenz for use with the Metric system of weights, and patented in 1822. Fig 21.

DENTAL SCALE - a scale used by dentists for weighing the ingredients of dental amalgam used to fill cavities in teeth, Fig 23.

DEPOSE - Registered, (French).

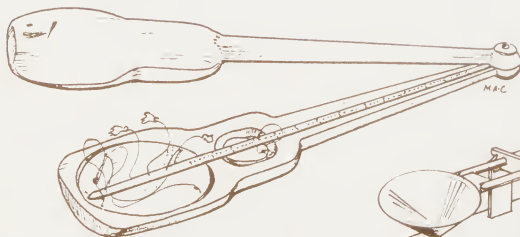


FIG 22. DO'TCHIN

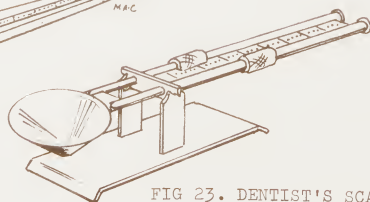
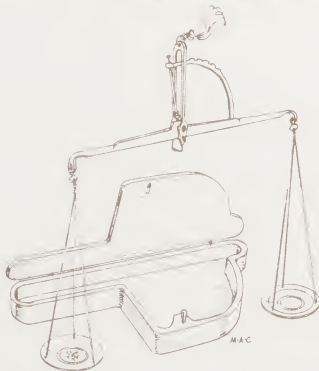


FIG 23. DENTIST'S SCALE

DIAL; DIAL INDICATOR - a flat circular sheet* carrying a circle of graduations* and used with a rotating pointer*. Alternatively, the dial may rotate against a fixed indicator*.

DIVISIONS - the small intervals between graduation* marks.

DO'TCHIN - a Chinese steelyard* commonly in the form of a slender ivory beam with two or three suspension cords, a pan suspended by four cords, and a weight hanging on a loop of cord. Contained in a box shaped like a violin, or like a lion. Used for weighing pieces of silver, gold, coins or other small items. Often called an OPIUM SCALE. Fig 22. Larger versions were used for weighing market goods.



PAN, SHOWING THE
SYMBOL FOR A DUCAT

FIG 24. DUCAT SCALE

DOUBLE HOLE END - a flattened beam end with two holes very close together. The thin strip of metal between the holes was formed into a rudimentary knife edge. A wire loop passes through the holes for attachment of the cords, Fig 6 No 11.

DROP - see PENDANT

DRUM - a cylinder used with a steel band* as part of a scale mechanism, for example, for the pointer*.

DUCAT SCALE - a scale designed specifically for weighing the Hungarian ducat. One pan was pre-loaded* to the weight of the coin so that no weights were needed. A quadrant* curved from the pointer to the beam and was marked to indicate any deficiency in weight, in grains, Fig 24. Thus the scale combined an equal-arm arm and pendulum. Made mainly in Nuremberg.

DUTCH END - a beam end in which the bearings* are in two side plates connected at the top and bottom by rods, Fig 6 No 23.

END FRICTIONS - see ANTI-FRICTION PLATES

EQUAL-ARM BEAM - a beam in which the end pivots are at equal distances from the fulcrum*, Fig 3a. See also UNEQUAL ARM BEAM.

ESSAY BALANCE - see ASSAY BALANCE.

ESTIMATING SCALE - a scale for ascertaining the weight of a large quantity of goods by weighing a small sample, for example grain scales*, paper scales* etc. See also COMPUTING SCALES, COUNTING SCALES.

EVEN-ARM SCALE - a scale with an equal-arm beam*.

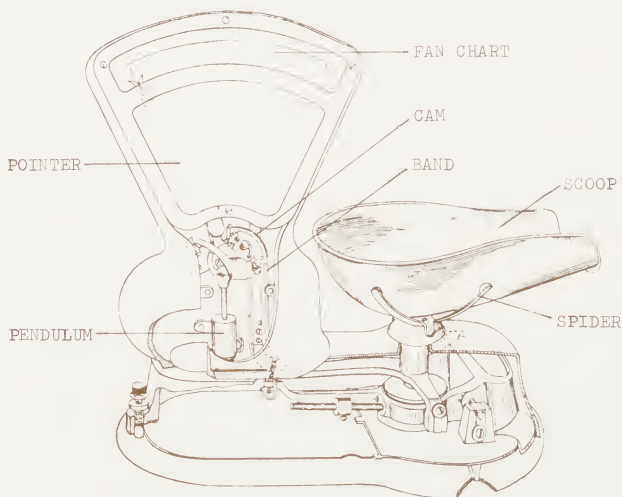


FIG 25. FAN SCALE

FAN CHART - a graduated card* in the form of a fan, or segment of a disc, Fig 25.

FAN SCALE - a scale with a fan chart*, Fig 25.

FAST - a scale is said to be fast when the weight indicated is in excess of the true weight. See also SLOW.

* An explanation of the term marked * appears in the Glossary

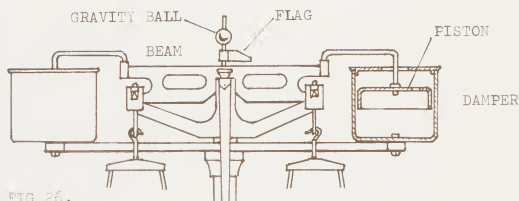


FIG 26.

REFIDUCIAL EDGE - see **READING EDGE**.

FLAG - a small flag-shaped weight on a spindle above the centre of the beam of a precision balance. The flag can be swung to any desired position for minute adjustment of the balance, Fig 26.

FLEXURE PIVOT: FLEXURE PLATE - a pivot* made from a thin flat strip of metal, which relies on the bending, or flexing, of the metal for its rotation. Also called a **PLATE FULCRUM** (USA), Fig 27.

FLEXURE RESISTANT - A flat spring used in certain types of spring balance. For example, in letter scales and stylus balances, Fig 28. The spring may form one of the arms of a Half-Wishbone linkage.

FOLDING GOLD BALANCE - a coin scale in a narrow box, which usually springs up into position when the lid is opened, Fig 30. Also called a **LANCASHIRE GOLD BALANCE** (18th C.) and, misleadingly, an **AUTOMATIC BALANCE** (by Sheppard & Musham).

FORKS - see **SHEARS**.

FRACTION BAR - a secondary beam, or side beam*, parallel to the main beam, and used to weigh fractional units. The capacity is usually equal to the difference between graduations* on the main beam. Fig 31.



FIG 27 FLEXURE PIVOT

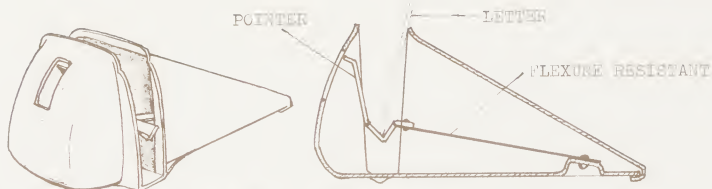


FIG 28. LETTER SCALE

FRACTION WEIGHTS - thin sheet metal weights graduated in fractions of a weight unit. e.g. $1/2$, $1/4$, $1/8$, $1/16$ carat; or in decimal fractions 0.5, 0.2, 0.1, 0.05 gram, etc. See also **GRAIN WEIGHTS**.

FRICTIONS - see **ANTI-FRICTION PLATE**.

FRICTION PLATE - see **ANTI-FRICTION PLATE**.

FULCRUM - the point around which a beam, or other part, rotates; the main pivot*.

GALLOWS - see **SHEARS**.

GAUSS' WEIGHING; GAUSSIAN WEIGHING - see **TRANSPOSITION WEIGHING**.

GOLD BALANCE - a scale for weighing gold coins, gold bullion or gold dust etc. See also **FOLDING GOLD BALANCE**.

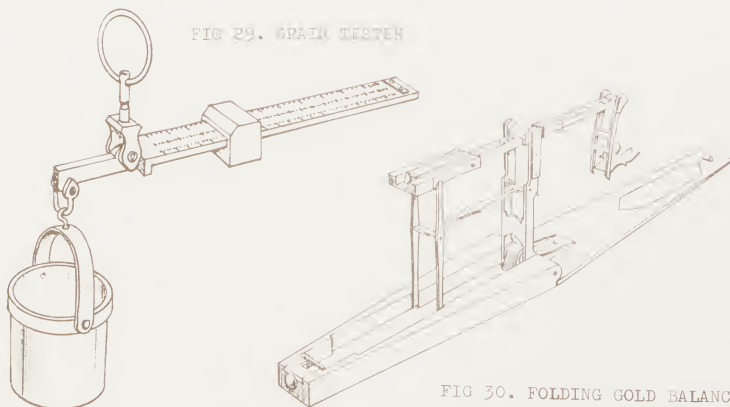


FIG 29. GRAIN TESTER

FIG 30. FOLDING GOLD BALANCE

* An explanation of the term marked * appears in the Glossary

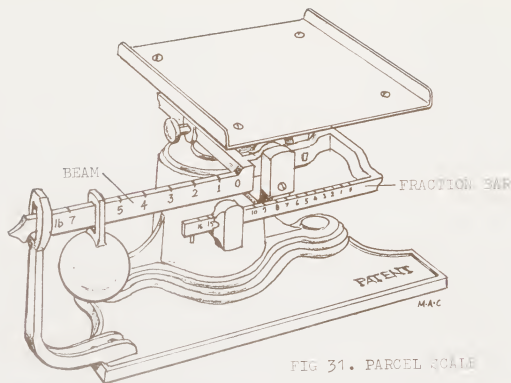


FIG 31. PARCEL SCALE

POUND PALE; POUND PLATE - the receptacle onto which a load is placed for weighing. Also called a COMMODITY PLATTER (USA). See also GRAIN PALE, PALE, PLATE.

P.P.O. - General Post Office. These initials were marked on scales and weights used by the British postal authorities, often in conjunction with an arrow signifying government property. ↑
GPO

QUADRATIONS - the scale marks on a chart*, beam*, quadrant* etc, which measure the weight, price or number. See also DIVISIONS.

RAPEY SCALE - a device for ascertaining the weight of a large volume of grain, cotton, wool etc. by weighing a small sample. A form of 'estimating' scale*. In England the graduations are in pounds per bushel. Also called a CHRONOMETER or CROMOMETER, or BUSH SCALE. See also GRAIN TESTER.

RAPEY TESTER - a form of grain scale* which also indicates the percentage loss in weight when grain husks, dirt etc. have been removed, Fig 29. See also PERCENTAGE SCALE.

GRAVITY BALL; GRAVITY WEIGHT - a weight on a threaded rod above the centre of a beam, and used to raise or lower the centre of gravity. A means of adjusting the sensitivity*, usually on precision balances, Fig 26.

GROSS WEIGHT - the weight of a quantity of goods including the container, wrapper etc. Gross weight = Nett weight plus Tare weight. See also NETT WEIGHT, TARE WEIGHT.

GUARD LINK - see PENDANT.



EQUILIBRIUM

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

SUMMER, 1980

M.A. CRAWFORTH, EDITOR

PAGES 233-260





THE SCALEMAKER

Woodcut by Jost Amann and
verse by Hans Sachs, 1548.

Sent in by Carl Mönnig, Köln.

I make scales large and small
With weights of all kinds
I hang them with pans of brass
For those who pay for it
I make gold scales in boxes
Which merchants have asked for
And other good spice scales
Which are used in stores.

*Der Wägleinmacher.
freicut Das Wäglein.*



*Ich mach die Wag/groß vnde klein/
Mit allerley Swicht in gemein/
Die behest ich mit Messing-schaln/
Wo man mirs anderß thut bezaln/
Nach auch in die Lädlein Goltwag/
Nach den haben die Kauffcut frag/
Darzu ander Wärgwäglein gut/
Die man in Krämen brauchen thut.*



COVER PICTURE

This rare and unusual sovereign scale has mass-stabilised pans. It is signed on the beam R.W.WINFIELD, BIRMT. The simulated gilding has a matt finish enhanced by burnished edges which gleam richly against the dark red velvet lining in the box. Weights are provided for the sovereign and half-sovereign, both signed R.W.Winfield and dated 1842. Dark maroon leather covers the box, which closes with a silver-plated hook. (For further information about Winfield, see EQM pages 10 - 12).

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

Bob Stein, Chairman	20 North Wacker Drive, Chicago, IL, 60606 U.S.A.
Michael Crawford, Vice Chairman	31 Park Lea, Sunderland SR3 3TA England
Albert Eaches, Vice Chairman/Treasurer	R.D.3, Box 241, Phoenixville, PA 19460 U.S.A.

©1980 International Society of Antique Scale Collectors



BALANCES by GREAVES

BY M.A.CRAWFORTH.

John Greaves & Son were brassfounders and steel converters who also manufactured various small metal goods, like saws, files and edge tools, in their Sheffield works. In the late 1840's the business passed to Edward Greaves who continued the main brass and steel work and also advertised that he made tuning forks, aolian pitch forks, patent portable metronomes, and so on. Among the items made by both John and Edward, were a variety of pocket scales for weighing coins or letters. They were small, elegant and attractive instruments made from well finished nickel alloy, and they were unusual in design.



FIG 1.

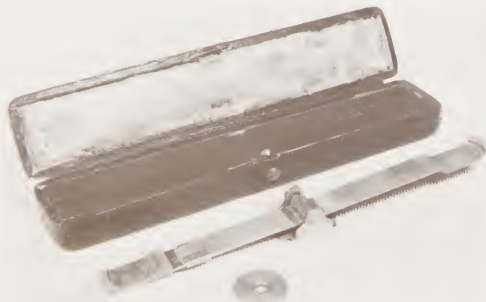


FIG 2.

Greaves' coin scales were made from flat strips of metal pressed at the ends to form platters for the coins. One type had a turn-over weight for the sovereign and half-sovereign, and a slide for determining the discrepancies in light coin, Fig 1. As the scale was of the rocker type, it was essential to locate the coins accurately, and so the platter was stepped to fit the diameters of the sovereign and half-sovereign. The steps also served to check the dimensions of the coins. This compact little balance was contained in a maroon leather-covered case with a black and gold instruction label inside the lid.

Another sovereign scale of Greaves' manufacture, had equal arms and pressed platters at both ends of the beam, Fig 2. It was pre-loaded to weigh the half-sovereign, and a disc-shaped weight was added to the weight platter to weigh a sovereign. This weight could also be used to test the accuracy of the scale by placing it in the coin platter, as the weight was almost the same diameter as a half-sovereign. The slide on this design was unusual in having vernier graduations for fractions of a penny - a more accurate method of reading than simple divisions. Again, the balance was contained in a slender maroon covered leather case.

In their advertisement for this balance (see Old Advert, p 238), Greaves & Son claimed that the design was based upon that of a Dr. Black. This may have been a reference to Joseph Black, lecturer in chemistry at Glasgow, and later at Edinburgh University, who, in the 1750's, first carried out reasoned sets of chemical experiments for which he used a conventional equal-arm swan-neck beam. The only relevance to Greaves' balance was the use of equal-arms - but such was the advertising world, then, (and now!).



FIG 3 A,B,C,D.

Greaves' letter balances were made on the unequal-arm principle, and one type, a bismar, had pivots which could be moved along the beam on a sliding saddle, Fig 3B,3C. A blued steel spring nib, attached to the saddle, engaged in notches in the beam at the various weight settings. The pivots were in the form of knife-edged feet which had to be placed near the edge of a table, or any convenient bearing surface, with the spring letter clip suspended over the edge. Hence the name 'Shelf-edge balance'. The beam was graduated, typically, from $\frac{1}{4}$ to 2 ounces. These slender balances usually had a fixed cylindrical weight stamped on the end with the Greaves' trade mark $\diamond$. Spherical weights were also used, Fig 3B, and the balances were contained in leather-covered cap-end cases made from laminated cardboard, only 120mm ($4\frac{3}{4}$ ") long.

A fascinating, and rare, variation of the spherical weight type had a fixed pivot and a telescopic beam, Fig 3A . Unusual in concept, this design had some characteristics of both bismars and steelyards, i.e. the graduations are unequally spaced, but only one of the arms changes length.

Simpler, smaller, and more elegant letter balances were made by Greaves. They had several pairs of fixed pivots below the beam, and again, they relied on a convenient surface for a bearing. The balance had to be pulled over the edge of the table to try each pivot in turn, until equilibrium was achieved. This design was related to the bismar, because the pivot point was different for each weight denomination. Examples have been seen with two, three, and four sets of pivots, Fig 3D.

Letter balances of Greaves' design have been seen with other firm's names marked on them, for example, S.Mordan & Co, and J.Rodgers & Sons. It is possible that the balances were made for these firms, by Greaves, under contract, or that other firms took up the design when Greaves went out of business. Letter balances with cylindrical weights, and graduated in ounces and tolas, were still available in the Army & Navy Store's catalogue of 1907.

The following dates were taken from Trade directories:-

John Greaves & Son	54	South Street, Sheffield.	1839
	54 & 56	" " "	1841
	56	" " "	1845
Edward Greaves (late }	56	" " "	1849
John Greaves & Son) }	76	Milton " "	1859, 1876.

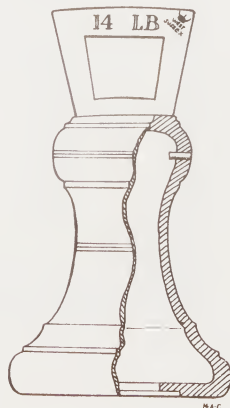


A CASED BELL WEIGHT

BY M.A.CRAWFORTH.

Cased bell weights are rare. This example has three verification marks for West Sussex pre 1878, and three marks of the numbered system, No.168 (also West Sussex). All marks were cancelled by the star  (omitted from the drawing for clarity).

The weight was made of brass and filled with lead, but the lead is now missing. The shell is quite thin, about 4mm, and there are two brass pegs inserted near the top of the cavity, probably to fill holes formed by supports for the core when casting.





OLD ADVERT.

JOHN GREAVES & SON'S

IMPROVED REGISTERED GOLD WEIGHER

ON THE PRINCIPLE OF

DR. BLACK'S SENSIBLE CHEMICAL BALANCE,

WARRANTED TO TURN WITH THE EIGHTH PART OF A GRAIN;

SHOWING THE DEFICIENCY IN VALUE OF SOVEREIGNS AND HALF-SOVEREIGNS,

IN PENCE AND FARTHING.



Additional Weight for the Sovereign.

Place the Coin in the Gauge, and move the Slide till the Beam lies level.—When the Edge of the Slide is at 0 the Coin is of the legal weight. For every Degree the Slide is removed towards the Fulcrum, deduct a Penny. If greater accuracy is desired, observe which of the marks, 1, 2, 3, on the Slide, is opposite a Degree on the Beam, and reckon 1, 2, or 3 Farthings in addition. The Beam is weighed for the Half-Sovereign: the loose Weight for the Sovereign is to be placed in the hollow.

NOTE.—At the Mint Price of Gold, (£3 17s. 10d. per ounce) a Sovereign of the current weight, 122½ grains, is only worth 19s. 10½d. and the Half-Sovereign of present weight, 114½ grains, is selling light only by weight, 14d. must be added to the deficiency of the Sovereign, and One Penny to that of the Half-Sovereign.

56, SOUTH STREET, SHEFFIELD.

Symposium '79

PAPER PRESENTED
BY D.F.CRAWFORTH



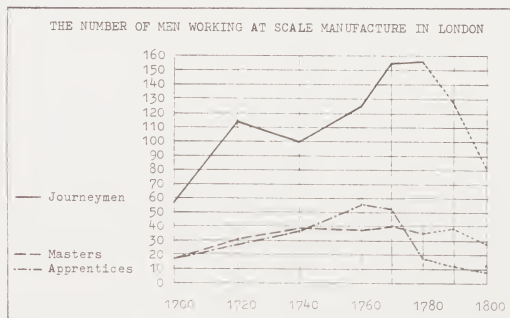
LONDON SCALEMAKERS (Part 2)

The Transmission of Scalemaking Knowledge from 1632 - 1800

The Blacksmith's Company Rolls provided a vast number of specific facts about individual scalemaker's lives, from which generalisations could then be made. These, in turn, lead to new questions, and a new picture of their lives.

How long did a master scalemaker work ? The average working life proved to be thirty-nine years, suggesting that the trade was not too arduous or unhealthy, too stressful or too dangerous.

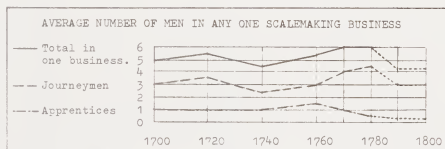
How many scalemakers were there in London ? We could only count those we had found, but even these counts imply a huge demand for scales and weights. We took counts in 1700, 1720, 1740, 1760, 1770, 1780, 1790 and 1800.



On studying the chart above, the optimism of masters from 1740 to 1770 is demonstrated by the numbers of journeymen and apprentices they had in their workshops. No master was going to commit himself to training a youth for seven years if he did not expect business to flourish.

There may have been equal optimism from 1780 to 1800, but the Blacksmith's records were going out of use at that time, and even the few rolls that were kept, were inadequate as a source of information. The record stated only that the apprentice had been freed, and stated nothing about who had trained him, or for how long, where he came from, or what his father did for his livelihood.

The counts show how many people worked in each scalemaking business, on average, and hint at a decline in the number of apprentices after 1780. If the Blacksmith's records are a reliable guide, the number of masters was remarkably constant throughout the 1700's, even though the amount of trading in London must have been increasing steadily. Were men making scales without belonging to a guild, or registering their apprentices? The assumption must be made that they were, as scales would have been required for the increasing trade with the colonies. However, we have no documentary evidence to substantiate this.



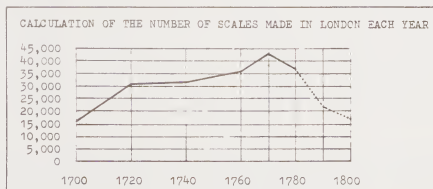
We have tried to determine the number of scales made in one year in London. John Lound gave us an invaluable sidelight on the subject with his account of a company which made scales by hand in the 1920's. This company had the following division of labour :

ONE COMPANY'S DISTRIBUTION OF LABOUR IN 1920

- 1 journeyman made the castings.
- 1 journeyman filed the castings.
- 1 journeyman buffed and polished the castings.
- 1 apprentice filed holes in the parts.
- 1 master finished holes, assembled and checked the scales.

These five men made about 4 scales a day in 1920, and there were several such groups in the company.

Note the similarity in the ratio of men in the business in 1920, to that of men in the business in the 1700's. Working on the assumption that it took slightly longer to make the fine scales of the 1700's, a chart was compiled, based on three scales a day :



There is no means of knowing the actual number of scales made, and 43,000 scales a year seems an incredible number, but we leave you to ponder the possible numbers and uses for scales in 1770.

To return to hard facts, we wanted to know how long each apprenticeship was. We had records for 550 scalemakers, but only 86 were for both the binding and freedom of specific individuals:

DURATION OF APPRENTICESHIP											
3 served for 6 years				5 served for 10 years				1 served for 23 years			
47	"	"	7	1	"	"	13	1	"	"	24
20	"	"	8	1	"	"	15	1	"	"	27
6	"	"	9	1	"	"	22	1	"	"	46

Unfortunately, the reasons behind the prolonged apprenticeships were never mentioned, and one can only speculate on the causes and the consequences of such bondage.

Were nearly all apprentices Londoners? It is surprising to find apprentices coming from thirty English counties, one from Ireland and one from Barbados, and only forty per cent from London. It is commonly supposed that there was little mobility in the 18th century, but our facts contradict this view.

Had many masters died while training apprentices? Five per cent of apprentices suffered this problem, and had to be moved on to another master, but 13% of apprentices were turned over for reasons other than death, and 5% of apprentices were turned over twice, or more. Several of these latter apprentices became well-known masters, and one wonders to what extent their varied training gave them an insight into the alternative ways to run a business.

Much of the period covered by this research was during the drift of people from the land to the expanding industrial towns, and this was evident in the number of fathers who were agricultural workers and cloth workers:

OCCUPATIONS OF FATHERS OF SCALEMAKERS					
Agricultural workers	60	Clothworkers	22	Other jobs	102
Scalemakers	45	Gentlemen	16	Unknown trade	107
Labourers	34	Carpenters	12		
Blacksmiths	22	Cordwainers	10		

Did many boys learn their trade from their fathers? Only 20% of the apprentices came from scale-making backgrounds, although one cannot rule out the possibility of some of the discreditable being the makers of scales and weights too.

There were some boys who could not learn from their fathers, because 16% of the fathers were dead when their sons were found, but this left 84% of boys who could have followed their fathers if they had so desired. Instead, they became scalemakers. Such mobility in the 18th century suggests an open-minded society, with masters prepared to accept boys from an entirely different background to their own, and with apprentices prepared to travel socially as well as geographically. This supports the idea that England was in a state of social flux, vigorous and prepared to take risks - an enterprising attitude of mind which was

a prerequisite for England's colonial expansion and trading ventures.

Was it an advantage to have a scale-making father, if the apprentice was to become a master?

OCCUPATION OF THE FATHERS OF MASTER SCALEMAKERS					
Agricultural worker	8*	Cordwainer	1	Shipwright	3
Aromatar	1	Draper	1	Smith & Blacksmith	9*
Bergeman	1	Fisherman	1	Soldier	1
Brazier	1	Gardener	2	Tanner	1
Bricklayer	2	Gentleman	5*	Tailor	1
Broker	1	Grazier	1	Tobacconist	1
Butcher	1	Innkeeper	1	Victualler	2
Carman	1	Labourer	4	Whip maker	1
Carpenter	2	Math.Instr.maker	1	Woolcomber	1
Chandler	1	Maltster	2		
Clothworker	5*	Pipe maker	1		83
Cook	1	Porter	1		
Cooper	2	Scalemaker	15*	Unknown trade	36

Obviously, they had a slightly improved chance of inheriting a business, but the diversity of origin is the impressive point, not the paternal relationship. Again, our illusions as to class rigidity in England, received a blow. Mobility was the rule, not the exception.

One group which sunk into obscurity, after their training, was the journeymen, but women figured surprisingly frequently in the Blacksmith's Gossamer Tolls. Very few women were ever bound apprentice, in this

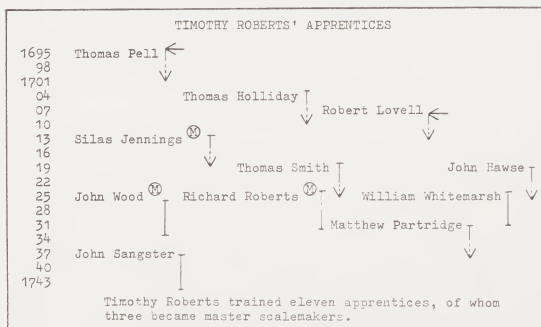
WOMEN ACTIVELY INVOLVED IN THE SCALEMAKING BUSINESS	
SUSANNAH ASTILL ^M	1796, probably widow of William Astill.
ALICE COURT ^M	1757 - 67, widow of Richard Court, Jnr.
MARY DeGRAVE ^M	c1799 - 1844, widow of Charles DeGrave, Sr., mother of Charles DeGrave, Jnr.
ANNA DUKE	1711, bound to Richard Sleigh, for £5.
ROBOTTA FREEMAN ^M	1714, widow of Samuel Freeman, 1st, mother of Samuel Freeman, 2nd.
ELIZABETH HARRIS ^M	1705, widow of John Harris.
SUSAN HART ^M	1690, widow of Joseph Hart, mother of Benjamin Hart.
ELIZABETH HUX ^M	c1696 - 1742, widow of Thomas Hux, Sr., mother of Thomas Hux, Jnr.
ANNE JACKSON ^M	c1730 - 39, widow of John Jackson, mother of Thomas Jackson.
ELIZABETH LAMB ^M	c1726, widow of Percivell Lamb.
BELTHIAS LOWY	1686, bound to David Wilford.
ELIZABETH MARSH ^M	1682, Richard Court, Sr., bound to her.
MERCY MEYMOTT ^M	1764 - 68, widow of Joseph Read, wife of Clement Meymott.
ELIZABETH MOFFATT ^M	c1787 - 89, widow of James Moffatt, mother of James Thomas Moffatt.
ELIZABETH PHILLIPS ^M	1722 - 41, widow of William Phillips.
ANNA ROWDEN	1706, bound to William Phillips.
ELIZABETH SANGSTER ^M	1768, widow of William Sangster, mother of Thomas Sangster, partner of John Sangster.
SARAH SHERMAN ^M	1642, widow of Henry Sherman.
^M Women who took on the responsibilities of master scalemaker.	

Company, only three having been bound to known Scalemakers. However, 17 widows took over businesses, were legally responsible for apprentices, or had labels made in their own name.

Having compiled these charts and lists, we could then take any one maker and compare him with the average. Timothy Roberts, Fig 9, will suffice to illustrate the point.

Timothy was the son of Richard Roberts, Citizen and Blacksmith, deceased, so he was among the 16% whose fathers were dead when they started their apprenticeship. Timothy must have grown up in London, as did 40% of the apprentices, because his father was a member of a London Guild. Only 14% of the London boys had fathers who were recorded as belonging to a Guild, but there is no evidence to show whether the Guild system was collapsing, or whether the clerk was negligent in recording the father's Guild.

Timothy Roberts was bound to William Taylor in 1686, and he had his first apprentice turned over to him in 1695, so he must have been bound for the normal seven or eight years.



He had three apprentices in his workshop most of the time, so he probably had about nine journeymen to work for him. A normal proportion of his apprentices became masters - three of the eleven - including his own son, Richard.

Three of his apprentices came from Cirencester, 86 miles from London, and all three were the sons of wool-combers. One can deduce that John Hawse, the first to come, in 1720, had sent home good reports of Timothy Roberts, and, also, that Timothy Roberts was satisfied with the work and learning capacity of John Hawse, and was prepared to take others like him.

Timothy Roberts worked for about 51 years, which was considerably longer than most, and when he died, his son inherited the business, as was usual when the son had the same trade.

In spite of his long working life, only a few scales are known to have survived, all of them coin scales, similar to the one in Fig. 9, but presumably, he made other scales of the types shown on his trade label. This illustrated a steelyard, an equal-arm beam on a tripod, bell weights, stacking weights and a brass cock (tap or faucet).

<i>The Standard w^{ts} of Following Coins</i>		
Alacabus		$6 = 6$
Alacabus		$3 = 3$
Carolus		$5 = 18$
Carolus		$2 = 21$
Guinea		$5 = 9$
Guinea		$2 = 16\frac{1}{2}$
Moider	<i>Tim Roberts at the Hand and Scales next y^e Corner of Queens Street in Watling Street LONDON.</i>	
Moider	<i>Makes & Sells all sorts of Scales, Weights, Stillards, & Cocks.</i>	
Pistol		$4 = 8$
Pistol		$2 = 4$
<i>Note, that Each Grain in Gold, is 2 at 4 p. Oun</i>		

Some time during his working life he moved his business four blocks, from the Hand and Scales in Watling Street, to the Angel and Scales in Bartholomew Lane. The second shop was on a prime site for a coin scale maker - directly facing the Bank of England.

In most ways Timothy Roberts was an entirely conventional figure, but Samuel Read, Fig 10, turned out to be exceptional in many ways when compared with the average.

We found the entry in the Blacksmith's Company Rolls, for Samuel Read's freedom :

Sam. Read, set app. to John Weale, turned over to John Lane, afterwards turned over to Benj.ⁿ Hart, both of this Co., on bill paid W^{re} cost. admin. 2 s. 6 d.

Samuel Read was very unusual in being trained by three different masters, only six such apprentices having been noted. He was also unusual in having all three masters to testify to the quality of his workmanship when he was made a freeman, "administered and sworn".



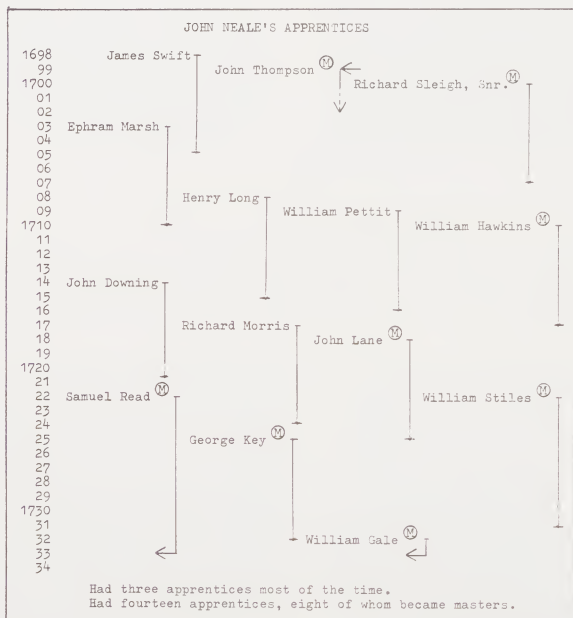
FIG 9.



FIG 10.

He was with John Neale, (Part 1 Fig 1), for eleven years as an apprentice, then with John Lane for one year and Benjamin Hart for one year. Thirteen years was an exceptionally long training, as only six men were apprenticed for longer than he was.

During his apprenticeship he knew other good scalemakers, William Stiles, George Key and William Gale, as can be seen in the following chart :

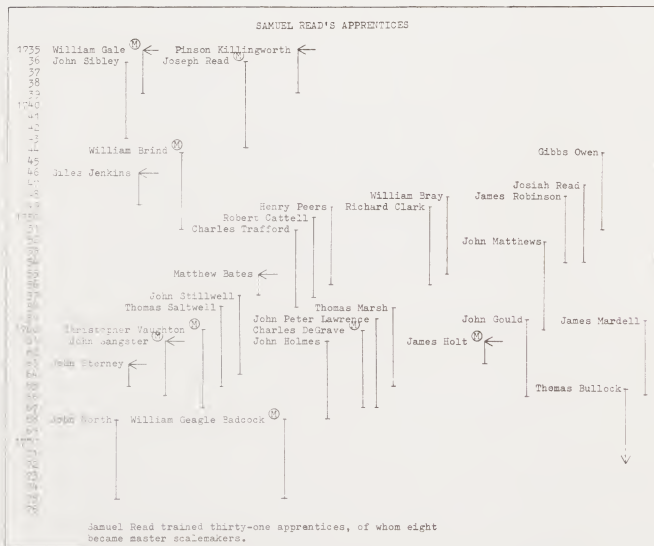


The chart shows that John Lane was also trained by John Neale, and when John Lane became a master, he took over the training of both Samuel Read and William Gale.

Thus, Samuel knew his second master beforehand, and knew his way of working, but his third master, Benjamin Hart, had been trained by John Snart, (Part 1 Fig 3 & P 211), so he gained the advantage of learning a second tradition of scalemaking.

Later, Samuel Read took over two of John Lane's apprentices, so presumably John Lane respected Samuel's ability as a scalemaker and as a teacher. Certainly, many other people considered Samuel worthy of

respect. He trained an enormous number of apprentices, and obviously ran a very large workshop, premises which continued to be used for scalemaking for over one hundred and fifty years.



Samuel Read had twelve apprentices in 1763, and assuming the normal ratio of journeymen to apprentices, he must have had about thirty-six journeymen. The noise and heat from forty-eight scalemakers must have been phenomenal !

The standard of workmanship was obviously high, because the Royal Society called in Samuel Read to check their standard weights, using the counterchange method (Gauss' weighing). For this purpose he took along his own precise scales.

One of Samuel Read's apprentices was Charles DeGrave, Fig 13, who eventually became his partner from 1780 to 1781. This was the beginning of a dynasty which continued in business until Avery's absorbed DeGraves in 1920, and continued to manufacture under the old name of DeGrave, Short & Co. Ltd. until 1962. The chain of knowledge was thus continuous from Henry Sherman in 1634 to W. & T. Avery Ltd today !



FIG 11.



FIG 12.

Samuel Read accepted Joseph Read as an apprentice in 1736. Was Joseph a much younger brother of Samuel's ? Both boys had come from the same town, Kidderminster, about 130 miles from London, and Joseph was the "son of Samuel, clothier". Unfortunately, although Samuel was also "the son of Samuel", his father's trade was not given, so there is no certainty as to their relationship.



FIG 13.



FIG 14.

Joseph Read started a business of his own, in competition with Samuel, but, although he was much younger, he died first, in 1764. His widow, Mercy Read, continued the business, taking over three apprentices before relinquishing her responsibility to her second husband, Clement Meymott. Later, she made scales with labels in her own name, Mercy Meymott.

The statistics and charts compiled from the Blacksmith's, and other Company Rolls, may be applied to any of the 550 scalemakers for

comparative purposes. The brief remarks about John Picard, Timothy Roberts and Samuel Read demonstrate the possibilities.

There are numerous chains of knowledge, and their interconnections are shown on a large chart of considerable complexity. Two of the chains have been extracted from this chart:

Henry Sherman	1633 - *1642	Thomas Hux, Snr.	1681 - *1696
Samuel Neale	1638 - *1692	Thomas Hux, Jnr.	1696 - 1708
Joseph Hart	1644 - *1693	Daniel Thompson	1708 - *1753
John Smart	1685 - *1731	John Swithin	1731 - 1764
Thomas Overing	1709 - 1731	James Moffatt	1735 - 1785
Benjamin Hart	1693 - 1735	James Thomas Moffatt	1782 - 1798
Samuel Read	1735 - *1781	Moffatt & Blackburn	1790 - 1800
William Brind	1751 - 1774	John Blackburn	1781 - 1832
Edward Phillips	1763 - 1781		

The most impressive point to emerge from this research was the continuity of the tradition of scalemaking in London. Some chains were brief, covering only two generations, but many were long and of great significance for the transmission of knowledge.

SOURCES OF REFERENCE

Livery Company Rolls, at the Guildhall Library:

Blacksmith's Co.	MS 2884	MS 2886/2	MS 2887/2
	2885/1	2886/3	2888
	2885/2	2886/4	2889
	2886/1	2887/1	
Hatterdasher's Co.	MS 15,860 - 8	MS 15,860 - 9	
Weaver's Co.	MS 4657 A, Vols 2,3 & 5.		MS 4655 Vol 11.
Joiner's Co.	MS 8052 Vol 4.		
Armourer's and Brazier's Co.		MS 12,080 Vols 1 & 2.	

Trade Directories of London:

Andrew's 1789	Kent's 1760,1800.
Baldwin's 1770,72,83.	Lownde's 1774,81,92,97,99.
Barfoot & Wilkes' 1783,93.	Mortimer's 1763.
Boyles' 1796	Payne's 1760,68,73,80.
Complete Guide 1763,68.	Wakefield's 1792.

Maps of the City of London:

Aldersgate Ward inscribed to Wm. Benn 1754.	
Barfoot & Wilkes' 1792.	Rocque's 1746.
Holwood's 1792.	Stow's Wards & Liberties C1600.

Royal Society, Phil. Trans. Vol XLII 1742/43 pp 550-556.

Adams. Arthur, The History of the Worshipful Company of Blacksmiths.

Ditchfield. P.H. The City Companies of London.

Herbert. W. The History of the Twelve Great Livery Companies of London.

Unwin. G. The Guilds and Companies of London.



NOTES & QUERIES

NQ 37. GLASS WEIGHTS ?

query from W.P.Lindeyer.

I would be mighty obliged if you can shed some light on these glass objects. They appear to be hand made and range in height from 1 7/8" (47mm) to 3 3/4" (95mm). Their weights are 37.53, 78.34, 128.32 and 194.8 grams. My guess is that they are glass weights, but I would like to have that either confirmed or denied.

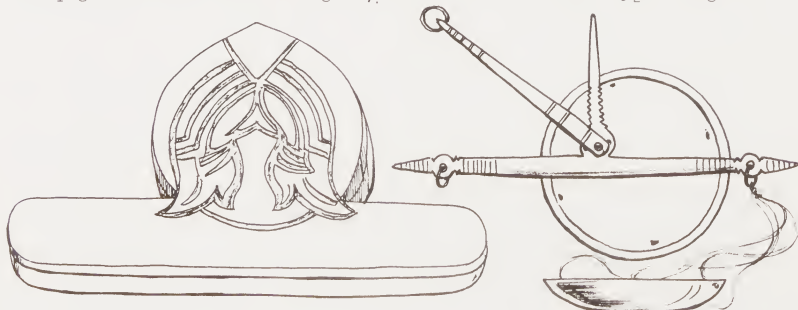


Can anyone help Bill Lindeyer ?

NQ 38. INDIAN OCEAN SCALES

query from V.Denford.

I would appreciate as much information as possible about this scale. It was purchased in Bendigo, Victoria, which is a gold mining area of Australia. The scale and pans are brass with copper wire rings. There are no hinges or fastener on the case, which is coloured with a thick red pigment. There are no weights, and the beam is 88mm (3 1/2") long.



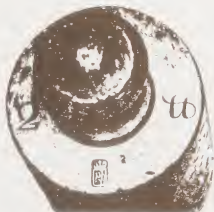
REPLY

from the Editor.

I have seen several of these scales, both plain wood and heavily carved. The finish varied from smoothly polished natural wood to a dried blood colour. The lid was fastened by a ring of leather, or other substance, which was slipped over each end of the box. Beams and pans were all very similar, with ring-and-hole bearings, and the main pivot on the pointer, in Roman style. They are reported to have come from Bahrain, Burma, India, Malaya, and Thailand - countries around the Indian Ocean.

Can any member add to this information ?

I am sending you photographs of two of my brass weights. The first one is marked 2 lb and has a stamp of a crown and shield (?). From which country and town does it come ? Secondly, a weight marked 4.9 Kg, C.S., D and 40%. What do the letters mean, and why 40 per cent ?



Can any member help D.Schmitz ?

I have a set of diamond scales in a polished rosewood box made by DeGrave Short and Fanner, with a table of weight and value of diamonds in the lid. There are two sets of square brass weights in lidded lockers. On the right of the box recessed 64,32,16,8,4,3,2,1 with no units. On the left 64,32,16,8,4,3,2,1 RUTTEE. Please can you tell me about the weights and when the set was made ?

REPLY

from the Editor.

DeGrave, Short & Fanner were listed in trade directories, at 59 St. Martin's le Grand, from 1845 to 1871. The unmarked weights are carats, and according to Kirch, the ruttee was a gold weight used in Bengal, and equal to 0.187 grams.

Since publishing the illustration of the unusually decorated Roberval letter scale (EQM front cover, p.124), the Registered number has been traced to the firm Setton & Durward, of Birmingham, manufacturers of scales, weights and stationer's sundries.

I am sure you will agree that the value of Notes and Queries lies in the answers. When you reply to a query, please send a copy to the Editor so that it can be published for the benefit of all members. Ed.

All notes, queries and articles etc. should be sent to the Editor.

Newsletter

A FREE TRANSLATION BY U. SCHMIDT
OF AN ARTICLE BY H. LOCKNER



BEWARE of FAKE NESTING WEIGHTS



The demand for nesting weights is great because of their beauty, but as there are so few genuine sets some clever-boys thought 'let's make some new ones'. After reading an article about reproduction nesting weights, I found that the 'best' set of my collection is false, and so I thought it would be a good idea to make known the main characteristics of repro-weights as a warning to other members.

Until the end of the 13th century, it is said, all nesting weights were made in Nurnberg. In the 16th, 17th, and 18th centuries Spain and Portugal were the main customers for Nurnberg weights, outside Germany's direct European neighbours. It is very easy to see this today. Nearly all weights for the Spanish market have, on the left side of the lid a small 'S', and those for Portugal a small 'P'.

PATINA. On original old weights the inner cups have mostly a lighter patina than the outer cup, and the lid, on the contrary, is a little darker. The reproductions are the same colour all over. Very often they have an unpleasant spotted yellow-green colour when made, but it is also possible to see examples that have been cleaned. Because the repros were made in large quantities, it was necessary to have an economical way to artificially patinate them. This was done by using acid, and so they had the same colour on all parts. Sometimes the patina was nearly black.

VERIFICATION MARKS. Mainly, the Spanish reproductions show a lot of unarranged Roman capital letters on the lid. They were supposed to be verification marks. Often they bear dates, mostly between 1750 and 1760. Sometimes they are stamped on the inner bottom of the outer cup, together with other fancy signs. On the lid there are sometimes Roman figures about 100 years later in style than the supposed date of the set. All these letters, numbers, figures and signs show a modern type style, and that is one of their defects. The other

is their arrangement. An adjuster has always been precise (it is necessary in his profession). He would have made his marks one after the other in a nice succession, and would not make such an unsightly chaos.

Sometimes, the reproducers made another mistake. For economy, the false marks were stamped during the production of the lid, and not on the completed weight. As a result some parts of the signs may lie under the fastener or under other parts.

There is also a third defect. On the reproductions, the numerals or nationalistic signs, themselves, indented, Fig 1. On genuine weights the signs are stamped so that the number or sign is level with the surrounding parts. On the lid a small perpendicular line is indented, Fig 2.

FIG 1.



EQUAL WEIGHTS. It is very easy to prove the genuineness of the inset cups by weighing. You need an equal-arm scale, and, if some lower cups are missing, you will need some equivalent weights.

FIG 2.



The same day, provided with its lid, is a weight and its equal in weight to all of the inner cups. Usually, the set has four inner cups, but start during the first of the difficulties with the process was a set of four cups complete. The smallest cups are usually missing. Between several other complete sets, the smallest ones are often replaced with, and you must learn to recognise them. There are four rules:

1. The smallest cup is equal in weight to the same weight as the lid of the cup.
2. Each larger cup is twice the weight of the next smaller cup, which fits into it.
3. Each cup is equal in weight to all the cups which fit inside it.

If you use a complete set be careful, because it could be a repro!



w = unit of weight

FIG 3.

etc. 32w 16w



8w



4w



2w



1w



1w

ACCURACY OF FIT. An old rule of the weight casters of Nürnberg says "The inset cups shall not move or rattle if the lid is closed". The reproduction ones rattle!

TRACES OF ADJUSTMENT. Genuine weights normally have a bottom which is flatter than the sides. This was necessary so

that material could be filed away until the proper weight was reached. So, the traces of filing may be a sign of authenticity.

DECORATION. Fig 4, shows a form of decoration with rings which were used in the 17th and 18th centuries to strengthen the outer cup of nesting weights of more than 4 pounds. The reproducers changed the design so that the mould could be opened more easily. They prefer the type shown in Fig 5, but the one in Fig 6 was also used.

COMPONENT PARTS. Genuine outer cups were composed of six pieces, but the reproductions are not. To avoid using complicated moulds some pieces were left off, so that there are mainly three pieces ; cup, lid, and fastener. Also, there are no tooling marks. It is necessary to look very carefully because the smallest details, like rivets and separating lines, are cast integrally on the reproductions.

MATERIAL. Nesting weights from Nürnberg were cast in brass and other alloys containing copper. Soft metals like tin or aluminium were never used because they would wear away in use.

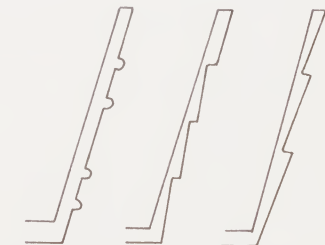


FIG 4. FIG 5. FIG 6.

ELEPHANTS. If the decoration of the outer cup is too nice - be careful ! One Spanish reproduction has on the lid two elephants which support the handle.

HISTORY. Until the early 1960's the price of nesting weights was not high enough to make repro's profitable. Around 1964/65 the first tin weights appeared on the market. They came mainly from Austria. Their defects: No adjustment marks, bad fit, weights not equal, light alloy metal. But they were well finished and the inset cups were turned. Mostly they were complete - as were all repro's. On the left side of the fastener you often find a crown. Decoration as in Figs 5 and 6.

The second series was the Spanish type, with elephants, which weighed 16 to 18 pounds, and had a black patina. Then followed the Portuguese type, beginning in 1969/70. There were more than 20 different models from 200g to 20kg. Their defects: Too nice, spotted, yellow-green patina, and a lot of unarranged signs. There is another primitive type which came from Spain, weight 500g to 3kg. Their defects: Only three or four cups, the set is complete, a simple untooled sand casting.

The last Spanish type is the 'Technical-weight'. It is the most dangerous type for the collector because it shows perfect reproduction. Their defects: No copper in the alloy, only 3 or 4 components.

From 'Vorsicht bei Elefanten, Zinn und Portugiesen' by H.Lockner. Kunst und Antiquitäten, Hannover 1976.



LETTERS

FROM C.MORRIS

BEAN END

Sorry, but I don't agree with you about the name of bean end No.18 "Antwerp Box End", (EQM p173). It is most typical of Nuremberg. I am firmly convinced that the scale No.551, by J.F.Wolachott 1938, is not original, but is a replacement bean from Nuremberg. (See Numismatic catalogue X, of November 1975, p114).

Have any other readers got evidence which would help to define this type of bean end ?? - Editor.



CROSSWORD

COMPILED BY R.D.BRASS

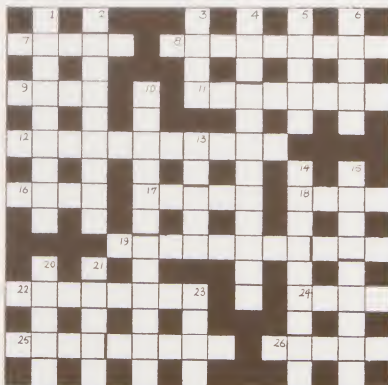
ACROSS

7. Is the inspector's assistant (4,5).
8. A beam with several scales (1,3).
9. Nuremberg (4).
10. What would the makers of postal scales have done without his (4,5).
11. Would change results of all the ISASC members go together in one small room with their collection? (11).

16. It would be a crying shame if the postal rate was to be revised once again. (4).
17. This is to a desert what EQM is to ISASC. (5).
18. Does it contain many scales at the auction? (1,3).
19. This stuff could leave its mark on your scale labels. (5,3).
22. This scale swings up to a balance. (3).
24. A pleasing place on the Riviera?
25. Was this weighing device made especially for anglers with tall stories about the fish they have caught? (4,5).
26. Bradford, Darby and This trio were responsible for one of the earliest shelf-edge coin steelyards. (5).

DOWN

1. Marked with divisions. (2).
2. Established and used by a weights and measures inspector. (1,3).
3. The rats change astronomically when the inspector puts his stamp on the scale. (4).
4. Province of Canada. (3,3).
5. Colourful craftsman fading away?
6. This fish loses a letter to become an essential part of a scale. (5).
10. Scrim monacle (anagram) - obviously not special enough to go into the collection of an ISASC member. (6,6).
13. Overcast; sounds as if he is without an heir. (2,3).
14. The scale is on the wall. (7,2).
15. What would an old banker have done without one? (4,5).
20. In come tall men, and used to make scales. (5).
21. Initially, all damage establishes neglectful treatment. (1,4).
23. Would he give you a round meal?



Solution in the next issue.

GLOSSARY OF TERMS CONTINUED

HALF-ROBERVAL - a scale which has a single pan supported above the beam by a leg and stay*, as in the Roberval* principle, combined with one of the various resistants*. e.g. Half-Roberval and steelyard; half-Roberval and pendulum etc. Fig 32. Also called a SEMI-ROBERVAL.

HANDLE - an ancient English term for the shears*, on small hand-held scales.

HANGER - a rigid rod hanging from a scale beam and used to suspend a pan*, plate*, weights or counterpoise*. The hanger may be STRAIGHT, CURVED or CRANKED, Fig 34, or may be a double sided STIRRUP HANGER, or BOW.

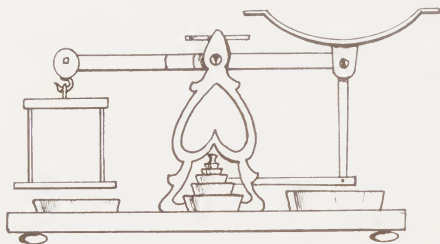


FIG 32. HALF-ROBERVAL & HANGING PAN

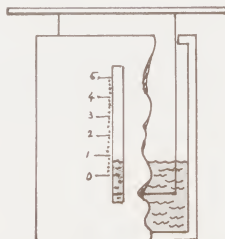


FIG 33. HYDROSTATIC SCALE

HANGING SCALE - a scale designed to be suspended from above, and which has its goods pan hanging below.

HARP TOP - the decorated loop at the top of the column supporting a scale beam, Fig 34.

HOOK END - a Medieval beam end in the form of a Hook, from which the cord ring was suspended, Fig 6 No. 4.

HUCKSTER SCALE - a small un-compensated spring balance used by green-grocers, travelling traders etc. (USA).

HYDROSTATIC SCALE - a scale incorporating a liquid for supporting, or counterbalancing the load. The liquid is used as a resistant* but may also be used as an indicator* simultaneously, Fig 33.

HYDROSTATICAL SCALE - an 18th century English term for a form of counterfeit coin detector* or specific gravity scale*. The coin was first weighed in air, and then re-weighed when immersed in water, Fig 35. Buoyancy was counteracted by special water weights placed in the pan above the coin (or by special settings on a steelyard). Counterfeit coins of the correct weight in air, were lighter than true gold ones when weighed in water.

INCLINATION BALANCE - see PENDULUM BALANCE.

INDEX - any device, or datum point against which graduation marks are read.

INDICATOR - any device which indicates weight, price etc. See also POINTER, INDEX.

INTERLEVER - a lever used between a beam and a resistant*, or between other levers, and used to provide the required lever ratio*.

INVERTED ROBERVAL - a scale constructed on the Roberval* principle, but which has the legs and stays above the beam, Fig 36. Also known as an IMPERIAL SCALE (UK). The long legs so achieved reduce the wear from side forces acting on the pivots.

INVERTED SWAN NECK END - a beam end curved downwards, in the opposite way to a conventional swan neck end*. The tip of the curved part is formed into a continuous knife edge with which a stilling spring* is used, Fig 6 No. 26.

JAPANNED - coated with a hard varnish-like substance fired in an oven and applied to tinware in imitation of Japanese lacquer. It was used on oval metal boxes (and other shapes) for 18th and 19th century English coin scales.

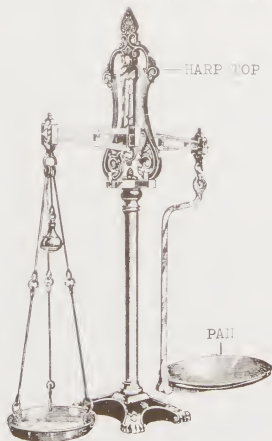


FIG 34.

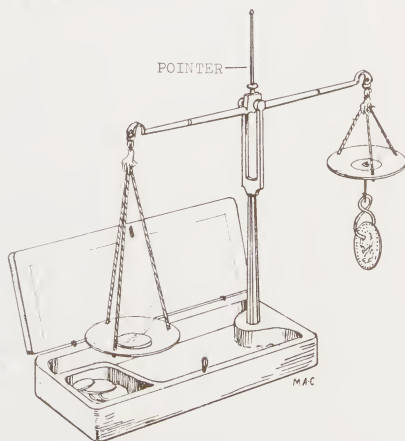


FIG 35. HYDROSTATIC SCALE

* An explanation of the term marked * appears in the Glossary.

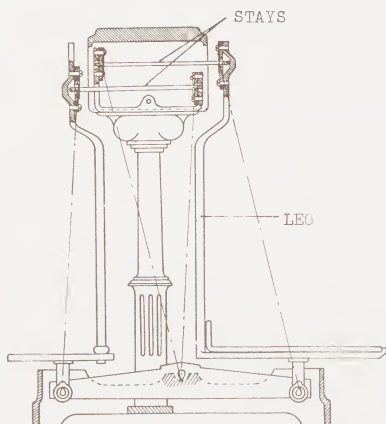


FIG 36. INVERTED ROBERVAL

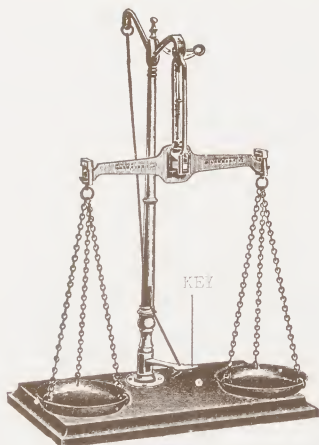


FIG 37. BANKER'S SCALE

JOCKEY SCALE - a scale adapted for weighing jockeys at race meetings.
A form of person scale*.

JOCKEY WEIGHT - see RIDER WEIGHT.

KEELED - vee shaped. A term describing the beams of old coin scales which had the top filed to a vee. i.e. pentagonal in section.

KEY - a hand operated lever used to raise a scale beam into the operating position; a LEVER LIFT. Fig 37.

KNIFE EDGE - a pivot in the form of a sharp edge, usually made of hard steel, sometimes agate, Fig 2. See also CONTINUOUS KNIFE EDGE, PIPPIN STEEL.

LADDER SCALE - a letter scale having several beams one above the other in a frame resembling a ladder, Fig 38. Scales with 2, 3 or 4 beams are known. They usually have an equal-arm* beam at the top (sometimes pre-loaded*), and have unequal-arm fixed-weight beams below.

LANCASHIRE GOLD BALANCE - See FOLDING GOLD BALANCE.

LATTICE BEAM - a scale beam with holes pierced in it, or made up from a number of separate elements, to reduce weight, thus improving the sensitivity*, Fig 39.

LEG - the vertical member of a Roberval* system, which supports the plate* or pan*. Figs 1, 32 & 36. Also called a STEM (USA).

LEVELLING FOOT - see LEVELLING SCREW.

LEVELLING SCREW - a screw on the base of a scale used for adjustment when on a sloping surface. Also called LEVELLING FOOT (USA).

LEVER LIFT - see KEY.

LEVER RATIO - a term describing the relative proportions of the arms of a lever, or a lever system. e.g. If a counting scale* has a beam with arms* of 500mm and 50mm, the lever ratio is 10:1.

LINK - a connection between levers, Fig 8.

LOADING BOX - see BALANCE BOX.

LOCKING GEAR - a device used to immobilize the moving parts of a scale to prevent unnecessary wear. See also TUMBLER.

LOOSE WEIGHT STEELYARD - a steelyard on which proportional weights* are suspended from the end of the beam, or a hanger*. The final balance is given by a small poise* sliding on the beam. Fig 9.

LOTUS BAL - see TRUMPET END.

MADE-UP BOX - a scale box made from several flat pieces of wood fixed together with nails or glue. Abbreviated to MUE. Occasionally called a waistcoat box. See also CUT-FROM-SOLID.

MAGNETIC SCALE - a scale which used two magnets with opposed poles as a 'resting point'. Fig 11.

MARMITE BALANCE - a form of open spring balance, shaped like a letter O. It was formerly used for weighing pigs, sheep, hides etc, Fig 14. It was sometimes called a 'C'-spring balance. An old English proverb for the manner was 'stiliard'.

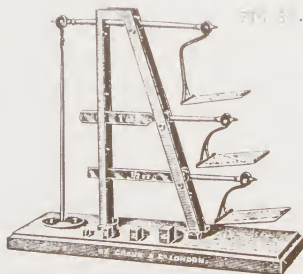


FIG 32. LADDER SCALE

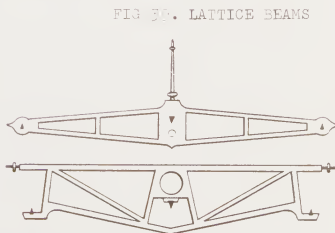


FIG 33. LATTICE BEAMS

* An explanation of the terms marked * are given in the Glossary.

MASS STABILISED PAN SCALE - a scale constructed on the principle described by Schickert (but used by others before him). The pans were supported above the beam by legs with weight, or masses, fixed to the bottom. It was essential that the leverage of the mass was greater than the load which was to be weighed, in order to preserve stability. Fig 41.

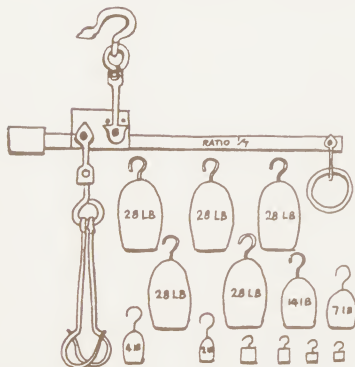


FIG 40. LOOSE WEIGHT STEELYARD.

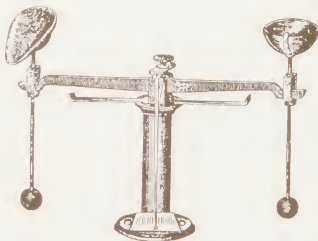


FIG 41. MASS STABILISED PAN SCALE

MICRO BALANCE; ULTRA M.B.; SEMI-M.B. - see PRECISION BALANCE.

MILK SCALE - a scale used to measure and record the milk yield from individual cows, etc.

MONEY OPERATED SCALE - see COIN OPERATED SCALE.

MOISTURE CONTENT SCALE - a scale adapted for measuring the moisture content of a substance, e.g. butter, cement, paper etc. In the example illustrated, Fig 42, the beam is pre-loaded* to 10 grams. Ten grams of the moist substance is placed in the pan, whereupon the indicator reads zero. The substance is then dried and re-weighed, and the moisture loss is indicated as a percentage of the full weight.

MOUSE - a weight attached to the cord used to lift a scale beam when suspended from a column, typically on money scales or jeweller's scales. The mouse was used instead of a key*, and, confusingly, was often in the form of a dog or lion !

MUB - see MADE-UP-BOX.

NEST WEIGHTS - see STACKING WEIGHTS, NESTING WEIGHTS.

* An explanation of the term marked * appears in the Glossary.

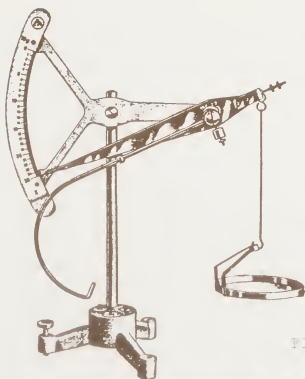


FIG 42. MOISTURE CONTENT SCALE



FIG 43. MAGNETIC SCALE

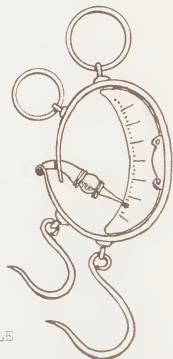


FIG 44. MANCUP BALANCE

NESTED WEIGHTS - weights in the form of cups which fit inside each other. Many sets were provided with a lid on the largest weight. See also **WEIGHTS**.

NETT WEIGHT - the weight of goods excluding the weight of the container, wrapper, etc. Nett weight is equal to Gross weight minus tare weight. See **GROSS WEIGHT**, **TARE WEIGHT**.

NOSE - a small point, or projection, on a sliding poise*, which engages in the notches on a steelyard blade*. Also called a **PAWL** (USA).

NOSE END - the end of the long arm of a steelyard beam.

NOISE - a groove on the blade* of a steelyard, which corresponds to a graduation* or division*.

NUMERICAL WEIGHTS - weights shaped like the numbers which represent their denomination. See **WEIGHTS**.

OBLITERATION STAMP - a mark used by Weights and Measures inspectors to cancel a verification mark*. In England a six pointed star was commonly used ✱.

OPIUM SCALES - see **DO'TCHIN**.

OVER-AND-UNDER SCALE - a scale with only a zero line and no graduations*. It shows if the load is above or below the weight value set.

OVERHEAD CHECK - see **STAY**.



EQUILIBRIUM

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

AUTUMN, 1980

M.A. CRAWFORTH, EDITOR

PAGES 261-288



PAGE 262



EDITOR'S COMMENT

Are you there, America ?

It has been pointed out to me, on more than one occasion, that although the majority of members are American (60%), most of our articles are about British scales and weights (66%). This is not a matter of prejudice - I would be delighted to have more American material. However, I can only publish what I receive ! A review of articles so far published, excluding my own, shows that there has been one article for every two British members, one article for every six German members, the same for Dutch members, but only one for every eleven American members.

So, there is scope for a much greater contribution from American members. When can we have a 'Profile' of Henry Troemner ? - The story of Howard & Davis ? - A study of early American scalemakers ? - An explanation of the unusual scales made by the Torsion Balance Co. ? - The history of Toledo's computing scales ? - A survey of American weight designs ? - Etc. Etc. ???



COVER PICTURE

This rare hydrostatical coin scale was made by Charles and Luke Proctor, instrument makers and scalemakers of Sheffield, 1774 to 1787. A forked steel column screwed into a socket in the mahogany box, and was used to support the scale beam. A full set of brass weights marked C. & L. PROCTOR was provided for the Johannes, Solitare and Guinea with their sub-divisions (rear row). Water weights were also provided for each of these coins, marked with the coin value in shillings and pence (centre row). The usual grain weights, marked with roundels, were also supplied (front row).

The coin was placed in the pincers below the small pan, and the weight was checked in the normal way, with weights in the other pan. Then the coin was immersed in water, and the appropriate water weight was placed in the small pan, to counteract the buoyancy. A true gold coin would balance level in both air and water, whereas a counterfeit coin of the correct weight in air, would float high in the water. (See also, the article on page 263).

Hydrostatical scales are sometimes found without their pincers or water weights. The only evidence that they were originally hydrostatical, if the label is missing, is the tiny hole in the centre of one pan, from which the pincers were suspended, short cords on the same pan, and a column for the beam.

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

Bob Stein, Chairman

Michael Crawforth, Vice Chairman

Albert Eaches, Vice Chairman/Treasurer

20 North Wacker Drive, Chicago, IL, 60606 U.S.A.

31 Park Lea, Sunderland SR3 3TA England

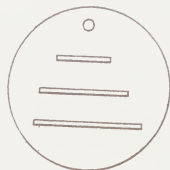
R.D.3, Box 241, Phoenixville, PA 19460 U.S.A.

1980 International Society of Antique Scale Collectors

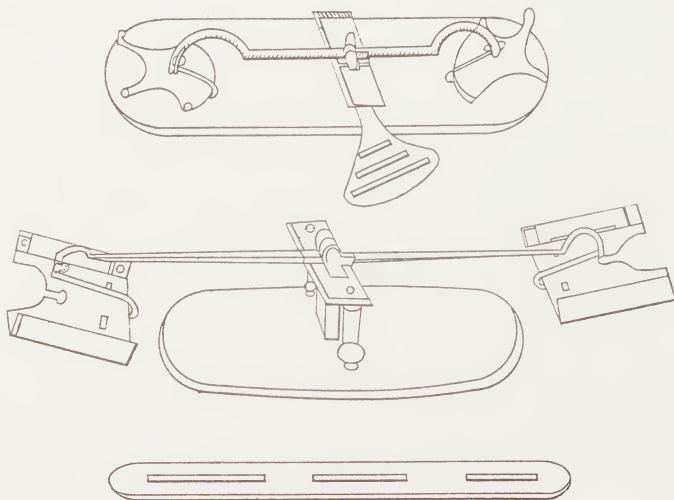


PATENTLY INTERESTING

On September 12th, 1774, Solomon Henry took out patent number 1080 for "An Instrument or Machine for Weighing the Coin of this Kingdom, and for ascertaining whether the said Coin is Counterfeit, or any Base Metal mixed therewith." Included in the specification were an equal arm beam and a beam with a sliding weight which "...will discover the exact number of pennyweights grains, or quarters that the said coins or commodities shall weigh..." and "to which shall be fixed a gauge consisting of a slit or cut through which the coin or coins may pass, and thereby, after weighing them, to discover the exact dimensions in thickness and circumference;" (The steelyard version was not illustrated in the patent drawings). A sprung lever was to be fixed to the centre of the balance to keep the beam steady "...for the more conveniently placing the coin and weights thereon," and "for the more speedily and exactly ascertaining the weight..." This lever was depressed to free the beam for weighing. (See also, illustrations on page 271).



*DRAWINGS FROM S. HENRY'S
PATENT No. 1080, of 1774*





COUNTERFEIT COIN DETECTORS

And the Need for their Use in England in the 18th & 19th Centuries

It is difficult to imagine the problems experienced by our forefathers when they had to use gold and silver money. Today, our coins are mere tokens which are always worth their face value in any transactions or exchange of foreign currency, but in the past these dealings must always have incurred the fear that coins were not what they seemed to be. Gold and silver money was only worth the value of the metal it contained, so any wear due to use, or any deliberate removal of metal, reduced the value of the coins. Worn coins were a daily problem, and this was bad enough, but if a counterfeit coin was unwittingly accepted the loss could be serious. For example, a well-paid foreman in the 18th century might have received a weekly wage of a golden guinea (21 shillings). If it happened to be a counterfeit, the true value could have been as little as 6 shillings - a loss in income of about 70%.

Of course, counterfeiting coins was against the law. In fact, it was considered to be so serious a crime that it counted as Treason, for which the penalty was death. The chances of a counterfeiter being caught, however, were not very high because until the early 19th century, there was no widespread police force. Some large towns, like London and Manchester, had a few constables, but smaller towns usually had no more than a couple of elderly night-watchmen who were powerless against determined and cunning criminals. Villages and the country districts had no law officers of any kind. So, the number of convictions were few, and bad coins circulated freely.

In earlier centuries the work of clippers, filers and counterfeiters was made easy by the irregularity in shape of the hand-hammered coins, but in the late 17th century they tried to end the problem by making the counterfeiter's job too difficult. Machine-struck coins were introduced and they were not only regular in size, but they were also given a milled, or serrated, edge which was difficult to reproduce by hand. Apparently, this had some effect, and a published guide to "The present state of Great Britain" was able to report, in 1758 :-

"Thus the reforming of our hammered coin into milled coin, entirely sunk the clipper's trade, and the trade of false coiners is greatly abated, it being more difficult to counterfeit milled than hammered money."

It was not long before the filers learnt to simulate the milled edge, and their activities became a widespread burden on the public, once again. Occasionally, the illegal reduction of coins and the distribution of counterfeits became so widespread that hardship was caused in a whole neighbourhood. Such an occasion arose in and around the Yorkshire town of Halifax, in the 1760's, when the counterfeiters remorselessly clipped or filed almost all the gold coins in circulation, and distributed their counterfeits throughout the district. The problem was officially ignored for

Some time, but when it was finally investigated in 1769, Lord Weymouth reported that :-

"...a gang of villains near Halifax have for some years past, made a practise of diminishing the coin, and of late years, of coining Portugal Pieces, that the practice was become so common that it put merchants under great difficulties with regard to their payments..."

Counterfeiters became highly skilled in their criminal activities. Some could clip thin slivers from the periphery of a coin so that it was difficult for the public to detect the difference by eye. Less skilled ones filed the metal off the coins to achieve the same result. The problem of the milled edge was overcome by setting the coin in a grooved stick and rolling the edge along a file to form indented serrations. The amount of metal removed from good coins was often substantial, as was pointed out by a newspaper, the Leeds Intelligencer of 27th July 1769 :-

"The number of sweaters and filers of gold coin still continue to infest the Western part of this county with impunity; and by various villainous ways and inventions, find means not only to get large sums into their hands, but also to circulate it again, after they have diminished it 20 per cent..."

Clipping and filing were not the only means of procuring gold. Some counterfeiters immersed the good coins in aquaregia, a mixture of nitric and hydrochloric acids, which slowly dissolved the gold. If a guinea was left in acid for 24 hours, about 1s 6d worth of gold was removed, and later this was recovered by filtering and refining a chemically induced precipitate. The action of the acid reduced the coin evenly all over, and discoloured the gold, so it was necessary to polish the maltreated coins to allay public suspicions.

Counterfeiters were not alone in removing gold from coins, as any unscrupulous person could do it, in the certain knowledge that a ready market existed among the counterfeiters. A popular method among the unskilled was a slow but steady method called sweating. In its simplest form, this consisted of rubbing coins together inside a leather bag, to simulate natural wear. The gold dust so formed, was collected in the bag and sold to the counterfeiters. To hasten the process, several bags full of coins were strapped to the wheel of a wagon and mechanisation took over. People who were not prepared to carry out the nefarious work of removing gold themselves, could lend their coins to the clippers or filers for an hour or so, for which service they received a fee.

In all these ways the counterfeiters obtained their gold, and the reduced coins were put back into circulation to dupe unsuspecting members of the public. Then came the difficult task of counterfeiting coins from their illegal gold. Clippings and gold dust were melted and silver was added to form an alloy. The hot metal was then cast into small blank discs in a brass mould. Each blank was hammered to the required size, and finally punched between engraved dies to impress them with markings like the real coins. Higher profits were made by alloying gold with copper, but as the coin had to be correspondingly larger, or lighter, the risk of detection was increased. Typical profits made by the Halifax counterfeiters was reported by Lord Rockingham, on the 1st of December 1769 :-

"The clipped guineas are diminished in weight of gold about 3s 4d. The Portugal money, coined as supposed out of clippings is usually moidores: they contain about 22s of gold, and pass for 27s, so that seven good guineas in passing through their hands left a profit of upwards of 27s."

Another method was to file two genuine coins to wafer thinness and to solder them to a disc of copper. The edges were then gold plated to complete the deception. Alternatively, the counterfeits were made entirely from copper and then gold plated. Deception was at its greatest when plated counterfeits were made the true weight of the real coin, as described in the Newcastle Chronicle of July 29th, 1777 :-

"...a great number of counterfeit guineas are now in circulation in different parts of the county of York, ...they are full weight, look rather pale, and the letters badly executed: their intrinsic value, in general is about five or six shillings."

Counterfeiting continued into the 19th century, but there were no further periods of saturation as had occurred in Halifax. In 1829, the Officers of the Royal Mint were asked for the best way of distinguishing genuine coins from counterfeits. The reply was that counterfeit half-sovereigns could usually be detected by their weight which was said to be 38 grains, instead of the correct 61 grains. In 1832, the old Treason law was repealed and the punishment for counterfeiting became transportation to the Colonies, or imprisonment. As the circulation of bad coins became less, so the public became less vigilant, and this provided the opportunity for another form of deception. Silver shillings and sixpences were plated with gold, and in a bad light they could be passed off as sovereigns or half-sovereigns at almost twenty times their intrinsic value.

Thus, throughout the 18th and 19th centuries, merchants, traders and the general public needed to be constantly on their guard against financial losses from any of the following bad coins :-

GENUINE COINS	CAUSE	CHARACTERISTICS	WEIGHT
	Worn	Slightly small, embossing reduced.	Light
	Sweated	Slightly small, embossing reduced.	Light
	Chemically reduced	Slightly small, all surfaces reduced.	Light
	Clipped or filed	Smaller diameter.	Light
COUNTER- FEITS	Alloyed	{ Correct size	Light
		{ Larger	Correct
	Laminated	Thicker	Light
	Base metal plated	{ Correct size	Light
		{ Larger	Correct
	Silver coin plated	Incorrect size and design	Light

How was it that people were deceived by the clipped, filed and counterfeited coins ? Firstly, the difference in size was often small and difficult to detect by eye. Secondly, the imitations were often made with great skill. Thirdly, the counterfeiters frequently decided which coins to copy with great cunning - coins from a previous monarch's reign or imported Johannis or moidores - coins with which the public was slightly unfamiliar, but which were common enough not to arouse curiosity because of their origin. Finally, and perhaps most importantly, the ordinary citizen did not often handle gold coins, so lack of familiarity and lack of another, similar but genuine coin

for comparison, made detection of counterfeits difficult. Thus, the people who were at most risk were those people who could least afford to bear the loss.

The consequences of clipping and counterfeiting were far reaching; if the bad money was accepted, there was personal loss or reduced business profits, but if the bad money was refused there might be no better alternative. Without good money, bills could not be paid and government transactions could not be settled. The realities of these conditions were indicated in the London Chronicle of 17th July 1773, which reported the situation in Leeds :-

"The current coin of this Kingdom is, in general, so very much diminished or debased, that few people here (in Leeds) will accept it in payment. This stoppage in the circulation of cash has already had a very bad effect upon all kinds of traffic, and is peculiarly oppressive upon storekeepers and the laborious poor, the former not daring to take such money for the necessities of life which they sell to the latter, and the latter not able to receive any other kind from their employers, as there is scarce any good money to be met with."

The problem was not confined to Yorkshire, but was encountered all over the country in varying degrees. In the capital, the London Chronicle reported on the 17th July 1773 :-

"An eminent Jew has, within these few days, purchased upwards of 2,000 guineas, for which he gave twenty shillings each: they were deficient in weight from 2s to 2s 6d."

And the Edinburgh Advertiser published a letter from a doctor on the 30th of July 1773 :-

"I have not, for this fortnight past, taken one guinea worth more than seventeen shillings."

Authorities were slow to remedy the situation. For example, the citizens of Halifax complained to the Treasury about the extensive counterfeiting, and Parliament was informed, but with little effect. In the absence of a police force, an excise man was sent to investigate, but before he could bring any prosecutions, he was brutally murdered by the counterfeiters. Only then did Parliament act in earnest, and a proper investigation was initiated.

Official provision was made for the receipt of light coins, to be returned to the Mint for recoinage, but the arrangement was inconsiderate to the ordinary man in the street. The consequent lack of incentive to return underweight coins to the bank was pointed out by the Edinburgh Advertiser of the 10th August 1773 :-

"A correspondent observes that it is hard on the poor, that there is no place opened to receive the gold coin deficient in weight, but at the bank; and they will not take less than fifty guineas. This to be sure obliges the rich, but the poor are to oblige themselves by going to the refiners or the goldsmiths, where they only give £3 17s an ounce, while the bank allows the rich £3 17s 10½d"

In the absence of effective control, clipping, filing and counterfeiting continued, and newspapers did their best to help the public by publishing

frequent warnings, like that which appeared in the *London Mercury* on the 13th of August 1776 :-

"A great number of counterfeit guineas are in circulation in the neighbourhood of Halifax; they are copper very slightly gilt; the impression is well done; the date is 1775, the M is too wide at the bottom, and the horse too long and small, and his hind legs too far out. The public will do well to weigh all the guineas they take."

Thus it was left to the public to look after their own interests - but how could the honest citizen protect himself ? Ordinary coin scales were suitable for evaluating genuine worn coins, but they were incapable of detecting alloy or plated counterfeits of the correct weight. The only protection was an instrument which could weigh and also determine the density of the metal - in other words, a counterfeit coin detector.

One type of instrument employed the laboratory technique of determining specific gravity, by weighing the coin first in air and then in water. As base metals are less dense than gold, their buoyancy in water is greater. Thus a counterfeit incorporating copper, but weighing the correct amount in air, would be too light when weighed in water. Such 'hydrostatical scales' as they were called, were variations of traditional equal-arm balances, and were made by a few makers including James Jackson of Birmingham, and Charles & Luke Proctor of Sheffield, (see front cover). The coin was weighed in air, and it was then immersed in water and re-weighed. A special water weight was added to the pan above the coin, to compensate for the buoyancy of gold. Any base metal in the alloy would cause the coin to rise in the water due to its greater buoyancy.

Assembling hydrostatical scales, handling two sets of weights and obtaining a tankard of water was time-consuming and complicated. Faster methods were obviously desirable, and new designs began to appear, to satisfy this need - a response which was symptomatic of the dawning Industrial Revolution.



FIG 1.

In 1773, Jonathan Hulls and William Bradford patented a hydrostatical balance of the steelyard type, which was manufactured by R. Darby of Chipping Camden. It comprised a simple, flat, rectangular brass beam, rather like a rule, which had a sliding weight and was pivotted on two tiny wedge-shaped steel

FIG 2.



MUSEUM OF HISTORY OF SCIENCE, CAMBRIDGE

feet. This instrument was placed on any convenient surface with the pincers hanging over the edge, ready for use - hence the name 'shelf-edge' type. The coin was weighed first in air and then in water, as before, but it was only necessary to re-position the sliding weight slightly, according to the separately inscribed water graduations, for checking the weight in water.

A modified version was later made, in which the adjustment was even quicker, Fig 1. The water graduations were omitted, and instead, a telescopic swan-neck was fitted to the end of the beam. It was spring loaded into two alternative positions, one for air, the other for water. Coins ranging from 4s 6d to £3 12s could be weighed, and this covered all the coins in England at the time - the guinea, double Johannis, and moidore with their subdivisions.

The famous instrument maker, Benjamin Martin, also made (or sold) a

FIG 4.



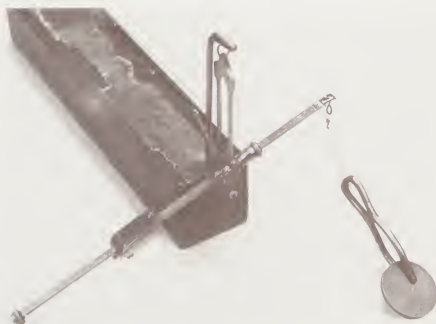
FIG 3.



hydrostatical steelyard, around 1770. It had an ivory beam similar to the Chinese do'tchin, and a pan with a hole in it for suspending the coin pincers, Fig 2. Two ranges of weight were provided, 0 to 40s for the more common coins, and 0 to 80s for the heavier Portuguese money. Three pens in the sharkskin case probably held a suspended weight for the common coins, another for the heavier coins, and a set of water weights.

Another unusual solution was patented by John Sebastian Clais, in 1772. It was of the pendulum type and was inscribed Anscheutz & Co. (of Soho, London) Fig 4. As with the previously described balances, the coin was placed in pincers and weighed in air and water. The instrument was self-indicating so no adjustment was necessary, and two sets of graduations were provided, one for air and the other for water. The divisions were in units of 6 pence, and for an 18 shilling coin, the difference between air and water was equivalent to one shilling, or in other words, the buoyancy in water was equal to 6 grains.

FIG 5.



IN THE SCIENCE MUSEUM, LONDON

Matthew Hill of London also made a hydrostatical steelyard, Fig 5. It was made about 1775, and had two sliding weights, one for setting the weight of the coin, and the other for discrepancies. The beam was notched with dual settings for air and water.

With all these hydrostatical balances, the maker had to allow for the buoyancy of the pincers, as well as the coin, and to prevent problems from the absorption of water, the pincers were suspended by a slender brass wire or a horse hair. Although surviving hydrostatical scales are now very rare, this method of detecting false coins was known to the public well enough for newspapers to make references to it, as in the Leeds Mercury of 27th February 1776 :-

"A species of counterfeit guineas of the date 1775 are now in circulation, and they are so well executed that it is difficult to distinguish them from the real ones. In air they weigh 62 grains above the standard, though they are worth only 14s when weighed in water."

Fig 6.



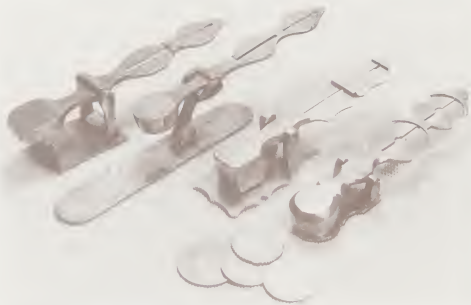
In spite of the improvements in speeding-up hydrostatic weighing, the method was still inconvenient – who wanted to search for a glass of water in the middle of a market transaction or at the Royal Exchange ? A much more convenient method of determining density was patented by Solomon Henry of London, in 1774. His unusual equal-arm balance was provided with a slot gauge for checking the diameter and thickness of the coins, Fig 6. As base metals are less dense than gold, their size is greater for a given weight. Thus a coin adulterated with base metal, but of the correct weight, was larger than a true gold coin, and would not pass through the slot.

The beam of Henry's balance was immobilised when not in use, and was released for weighing by depressing the central spring-loaded lever. The gauge swivelled sideways for storage in the sharkskin case. A steelyard version of the balance was also made, Fig 7, and the instruments were advertised in the Liverpool General Advertiser of 12th April 1776 (see Old Advert, page 282).

FIG 7.



FIG 8.



The next development was the incorporation of slot gauges in the beam of the balance. In England, the first of such balances may have been the common brass sovereign rocker which appeared in the 1820's. A great many were made in styles similar to Fig 8 No. 4. Rare variations had a column which folded flat against the base, Fig 8 No. 2, or were suspended by a handle and had a beam which could be folded in two to make it very compact for the pocket, Fig 9. Less rare was Bennett Cattle's modified rocker to which he added a small sliding weight for ascertaining the value of underweight coins, Fig 10. Rockers were also made for silver coins, usually of a larger size suitable for counter use, but examples are rarely found today, Fig 11. A triple beam version was made for the half-crown, shilling and sixpence, probably in the first half of the 19th century, Fig 12. ➤

FIG 9.





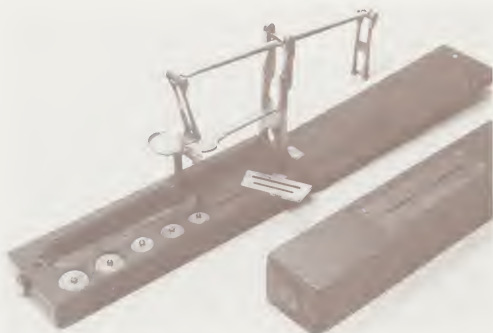
FIG 10.

FIG 11.



FIG 12.

FIG 13.



Makers of folding gold balances also provided slot gauges, but examples are very rare. Fig 13. One version from the 1820's, had a loose gauge for the sovereign and half-sovereign, stored in a recess in the case. No gauge was provided for the guinea and its sub divisions, although weights were provided for these coins. Another example was made by W. & T. Avery Ltd., in the 1890's. It included a slotted plate set in to the top of the lid. A non-folding type for counter use had slots incorporated in the beam, and was illustrated by Sheppard & Misham, (Sh. & M. Fig 72).

Ideas for further hastening the process of testing coins appeared in the middle of the 19th century. In 1855, G. Davis patented a multi-beam, multi-slot counterfeit coin detector which could be screwed to a shop counter above the cash drawer, so that good coins fell straight in to the drawer, or which was provided with an open-fronted box, Fig 3. Each slot was provided with its own balance beam, and was marked with the denomination of coin - gold sovereign and half-sovereign, silver crown, half-crown, florin, shilling, sixpence, fourpence and threepence. A genuine coin placed in the appropriate slot passed through the gauge, depressed the beam, and fell into the drawer

FIG 14.



or rolled out of the front of the box. A light coin, or an oversize coin, remained in the slot.

Another idea, patented by J.P. Savouré in 1854, had a rectangular rocker beam with six slots for gold and silver coins. In this design the slots were very slightly short, so that a coin of correct size remained almost half way through the slot and was weighed and gauged simultaneously. Balances matching this description were manufactured by William Harris & Co, of London and Liverpool, Fig 14.

The rocker balances illustrated here are not scales, they are testers or provers for a specific pre-determined weight. If the coin is not correct, the actual weight cannot be determined. True scales enable the weight to be measured, whatever it may be, by the use of a set of weights, or by some other variable resistant. People who wanted this more comprehensive facility, and a higher degree of accuracy, could still obtain conventional coin scales throughout the 19th century. They could be supplemented by a simple thickness gauge, as made by Fawcett & Butterworth, Fig 13. The makers claimed that their gauge, alone, was sufficient to detect counterfeits !

Roberval scales were, apparently, considered too insensitive for weighing coins because of the friction from the extra pivots. Only one example is known to the author, and it is a combined letter scale and coin scale with slot gauges in the letter plate, Fig 15.

Towards the end of the 19th century, two further patents were obtained for counterfeit coin detectors. J. Wedderburn's was an extraordinary combination of a common sovereign rocker mounted on the weight of a much larger letter rocker. A thickness gauge was mounted on the base. It seems doubtful that



FIG 15.

any were ever made, Fig 16. The other patent was also a combination - a pen holder and coin bismar which incorporated a slot gauge in its tubular beam, Fig 19. It was patented by R.W. Reiss, in 1895, the same year that he obtained an American patent for the same design. ➤

FIG 16.

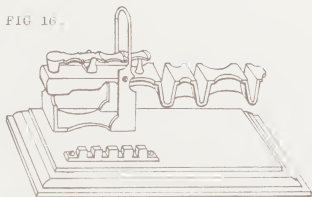
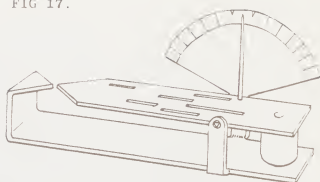


FIG 17.



Even in the early 20th century, there was still thought to be a market for counterfeit detectors. In 1909, Clarke and Spinks obtained a patent for their modernized version of the common sovereign rocker, Fig 18. In 1917, the need to use coin balances ended when the circulation of gold coins in England was terminated. Yet, in 1950, S. Sydney acquired a patent for a slotted beam rocker with a quadrant and pointer, Fig 17. Presumably, this was for silver coins which were still in circulation, or for gold coins in use overseas.

Evidence of the past need to use counterfeit detectors in England is substantial, and control by the authorities of counterfeiting activities was utterly inadequate. The solution to the problem was in the hands of the citizens themselves. After the middle of the 18th century, there was a great variety of instruments available to the public for their protection. But the use of detectors was inconvenient. It prolonged transactions and there was always the implication that the user did not trust his fellow citizens. So, it was people's failure to check every coin they handled which was the greatest contribution to the continued success of the clippers, filers and the counterfeiters.

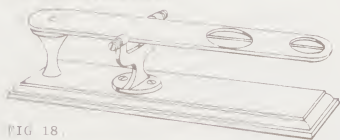


FIG 18.

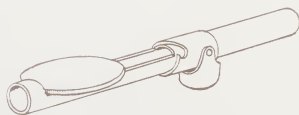


FIG 19.

BRITISH PATENTS FOR COUNTERFEIT COIN DETECTORS

DATE	No.	PATENTEE	SYSTEM	EXAMPLES SIGNED BY
1753	686	J. Hulls & W. Bradford	Hydro	Bradford, Darby & Hulls
1772	1014	J. S. Clais	Hydro	Anscheutz & Co. Anscheutz & Schlaff
1773	1053	J. Andrew	Hydro	
1774	1080	S. Henry	Gauge	S. Henry. B. Stubbs
1853	1979	G. Davis	Gauge	W. & T. Avery
1854	2298	J. P. Savouré	Gauge	Harris & Co.
1893	13403	J. Wedderburn	Gauge	
1895	21480	R. W. Reiss	Gauge	
1909	3131	R. Clarke & E. Spinks	Gauge	
1936	32942	S. Sydney	Gauge	

REFERENCES

- | | |
|--------------------|--|
| BECKET.J.B. | The use of the Hydrostatical Balance. Bristol 1775. |
| CRAIG. Sir John. | The Mint. Cambridge. 1953. |
| LING ROTH.H. | The Yorkshire Coiners. Halifax 1906. |
| LORD LIVERPOOL. | A Treatise on the Coins of the Realm. Oxford 1805 |
| MARSH.J. | Clip a Bright Guinea. London 1971. |
| SHEPPARD.H. & J.F. | MUSHAM. Money Scales and Weights. London 1923, r 1976. |
| ANON | The Present State of Great Britain. London 1738. |

British Patent Office Records.

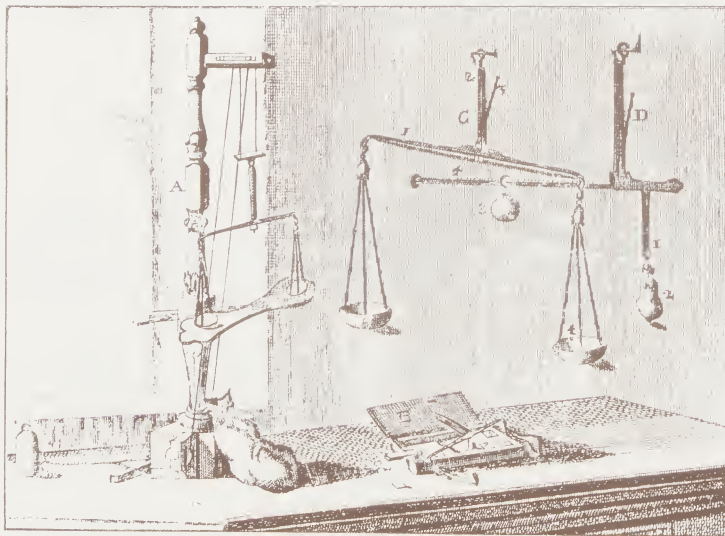
NEWSPAPERS	Edinburgh Advertiser	Leeds Mercury
	Faulkner's Dublin Journal	Liverpool General Advertizer
	Gentleman's Magazine	London Chronicle
	Leeds Intelligencer	Newcastle Chronicle



OLD PRINT

SENT IN BY D.SCHMITZ

Note the money scales on the table and the unusual platform for the pans on the pillar. Does anyone know the origin of this old engraving ?





RUSSIAN NESTING WEIGHTS BY C.MÖNNIG

The master cup of this rare set of brass weights has a lid shaped like a cupola, or dome. Inside, the shallow cups nest half way into the cup below, and form a conical pile inside the dome (The three smallest ones are missing). Many stamps were applied inside the cups and on the bottom :-

1. The Imperial crowned double-headed eagle of Czarist Russia (1815 to 1918) see Figs 1 and 1a. (Opposite).
2. A mermaid with a sword and shield (Polish 'Sirena'), and the Cyrille letters **Г. ВАР.** = G.WAR. (Government of Warsaw). Figs 2 (2a ?).
3. A rectangular stamp with the year 1897, Fig 3.
4. An oval stamp with most of the letters unreadable, except WARS(, Fig 4.
5. Denomination: 48, 24, 12, and 6 (3, 2, and 1 are missing).
6. The number 3 - perhaps an ordinal number ?

The master cup weighs 48 solotnik, and the others 24, 12 and 6 solotnik, respectively, thus the complete set would have weighed 96 solotnik, or one pound: -

1 Pound = 12 Lane = 96 Solotnik = 409,517 gram. 1 Solotnik = 4.2658 gram.

REFERENCES

Bruckhaus Konversations, Lexikon 14, Edit. Leipzig 1898.
 Böncke, H.H. Zehntausend Jahre Waage. Balingen 1966.
 Fish, Bruce. Scales and Weights. Yale U.P. Newhaven, USA, 1965.



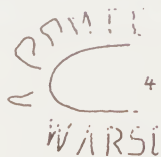
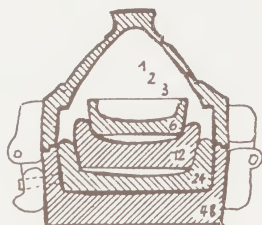
GOLDEN SMOKE

ANON

The story goes that Queen Elizabeth 1st was told by Sir Walter Raleigh that he could weigh the smoke produced by his newly discovered tobacco, and that he would wager several golden sovereigns on it. The Queen, observing the smoke drifting up towards the ceiling, accepted the wager and challenged him to prove it.

Sir Walter took out his money scales and weighed a pipe load of tobacco, filled his pipe, and lit up. He calmly chatted to the Queen about his exploits on the high seas until the pipe was finished. Then he carefully weighed the ashes and, after a little mental arithmetic, he told her the weight of the smoke.

With a wry smile, the Queen commented that she knew many men who could turn gold into smoke, but Sir Walter was to be commended for turning smoke into gold !



G.M.
Jan. 1890



NOTES & QUERIES

NQ 42. ASSAY TONS

query from J.E.Gerling

I purchased an analytical balance made by Ainsworth (Serial No. 4752) recently, in Lincoln, Nebraska. In one drawer of the balance was a set of weights having characteristics I have not seen or heard of. What are they and how were they meant to be used ?

The set consists of seven brass weights in a wood case 96 x 43mm ($3\frac{3}{4}$ x $1\frac{1}{2}$ ins). The weights are stamped on the posts with the following number and have the following measured weights :-

MARK	WEIGHT	MARK	WEIGHT
4	116.664	0.2	5.8332
2	58.332	0.1	2.9166
1	29.166	0.05	1.4583
0.5	14.583		

The 1 unit weight has stamped on its face the following 1 ASSAY TON 29.166g.

Can any member help John Gerling ?

NQ 43. TREATING RUST (NQ 35)

reply from J.L.Wage

Sand blasting is a non-exhausting alternative to wire-brushing and emery-rubbing. It reaches the most difficult hidden spot, providing one knows a man who has the right equipment and knows how to use it.

Following the advice of a most traditional and conservative Antwerp green-grocer, who still uses weights and Beranger scales, I put rusted iron weights into boiling water with plenty of sodium carbonate, and let it boil for an hour or so. Even if this does not remove all rust, it is a very effective preliminary treatment.

In Antwerp, and other Flemish towns, it was compulsory for retailers to give this rust treatment before their weights could be stamped for a new period, by the inspector.

As far as my experience goes (covering iron coins as well) no protective coating on iron objects is fully rust preventing, since rust is not generated at the surface only, but may come up from the inner body (and soul) of the metal - just as is the case for human beings !

NQ 44. F.E. BECKER & Co.

query from I.Herre

Please can you tell me something about the following scale manufacturer ?

F.E.Becker & Co. (W.& J.George Ltd Succrs) Hatton Wall, London.

REPLY

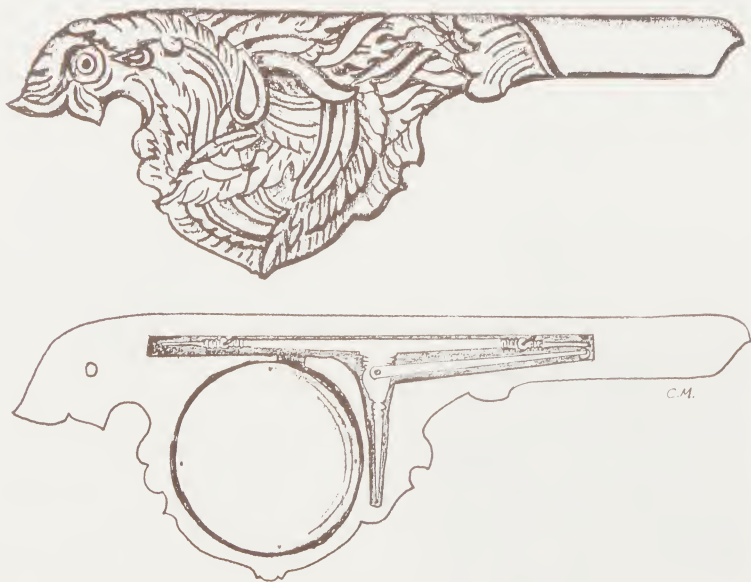
from the Editor

F.E.Becker & Co. of 23,25 & 27 Hatton Wall, London, were makers of assay, bullion and chemical balances in the late 19th century. They were succeeded by W.& J.George c1905, but apparently Beckers did not go out of business entirely. The firm later became George & Becker Ltd, until in 1956, they were amalgamated with Griffin & Tatlock, and Standly, Belcher & Mason, to form Griffin & George Ltd., which is still in existence as wholesale suppliers and manufacturers of laboratory equipment.

NQ 45. INDIAN OCEAN SCALES

note from C.Mönnig

My gold scales from Burma are very similar to those shown in NQ 38, but the box is not symmetrical. It is made from exotic Asiatic wood, and the top is decorated with carving of a fabulous creature with a fish's mouth and feathers. The box is held together with dark red cord. (see below).



ALL NOTES, QUERIES AND ARTICLES SHOULD BE SENT TO THE EDITOR.



OLD ADVERT.

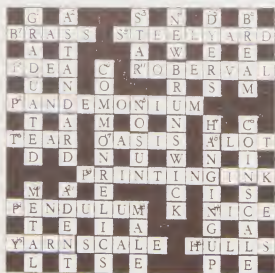
Solomon Henry's advertisement appeared in the Liverpool General Advertiser on April 26th, 1776.

The lines and letters below the heading represent stop gauges for the three gold coins, guinea, half-guinea and quarter-guinea.

For readers not familiar with 18th century type, the letter 'E' is a form of 's' used in the middle of words, and the 'A' has a decorative flourish joining the letters c and t.



CROSSWORD



FOR detecting Counterfeit or diminished GOLD COIN of these Kingdoms. The Counterfeit Gold Coin of the present Reign is instantly detected, by HENRY'S ROYAL PATENT BALANCE & GAUGE, approved of by his Majesty in Council, Bank of England, and Bankers. Among the many counterfeit Guineas detected, by the Patent Gauge, being full weight, and the die well executed, with those stop'd at the Bank, ere found four shillings and six-pence below standard: others, described in a letter to the Excise wanted 8s. 7d. of their value. The Guinea mentioned in the York Paper, February 25, wanted 7s. Since which there has appeared base Guineas which are of very little value, and greatly deficient in weight, of appearance equal to the present Coin of 1775. And all the base Guineas are so well executed as not easily to be discovered by the eye, on the nicest inspection. The above useful Gauge, or Balance and Gauge, are mark'd with the Patentee's name, and private mark, to prevent them being counterfeited; and the Patentee has appointed them to be sold wholesale in London, by James Stamp, Goldsmith, No. 83, Chesplate; Wooley and Hemings, Hardware and Toyne, No. 137, Chesplate; Sobbs and Dean, Hardwarmsmen, No. 41, Fiftistreet Hill.

N. B. Any person or persons counterfeiting the said Patent Gauge, or Balance and Gauge, or any one, giving information of the same, shall, on conviction of the party or parties so counterfeiting the same, receive a reward of Twenty Guineas, by order of the Patentee, at Messrs. Martin, Stone, Blackwell and Co. Bankers, Lombard Street, London.

All Letters, Post paid, duly answered.

The Royal Balance and Gauge, are sold at 15s. 6d. and the Royal Gauge at 15s. 6d. each; are to be had of Mr. John Kaye, Messrs. Prefton and Reynolds, and Mr. Walley, Goldsmith, Liverpool; Mr. Bromilow, Prefcot; Mr. Ollivant, Manchester; Mr. Ainsworth, Warrington; Mr. Doncaster, Wigan; and Mr. Anderfon, Lancaster.

SOLUTION TO THE CROSSWORD IN THE SUMMER 1980 ISSUE, ON PAGE 254.

GLOSSARY OF TERMS CONTINUED

- PAN - a concave receptacle used on a weighing device to contain the weights or the goods being weighed, Fig 34. Originally called a SCALE. See also PLATE.
- PAPER SCALE - a scale specially adapted for weighing paper, often of the estimating type*, for example, the weight per ream is indicated from a single sheet of paper, or from a small sample of specific size. (a ream was 480, 500 or 516 sheets, generally). Fig 50.
- PAWL - see NIB
- PENDANT - a small U shaped link suspended from the bottom of the shears*, and used to indicate the true vertical, and to prevent the shears opening unintentionally, Fig 13. Also called a DROP or a GUARD - LINK.
- PENDULUM SCALE - a scale which uses the varying leverage of a pendulum as a resistant*. i.e. as the pendulous weight swings out sideways an increasing force is required to balance it, Fig 45. Also called an INCLINATION BALANCE (Germany). Some scales have two pendulums which swing out in opposite directions, and are called BILATERAL PENDULUM SCALES, Fig 46. See also CAM-AND-PENDULUM, and QUADRANT SCALE.

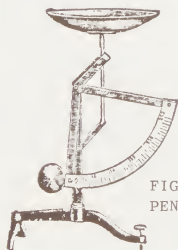


FIG 45.
PENDULUM SCALE

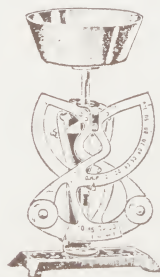


FIG 46.
BILATERAL
PENDULUM

PERCENTAGE SCALE - a scale specially adapted to indicate the percentage loss in weight of a sample of goods after drying, cleaning etc.(USA). See also MOISTURE CONTENT SCALE.

PERSON SCALE - a scale constructed for weighing people. There are various forms, e.g. Hospital scales, Baby scales, Jockey scales etc.

PFITZER SCALE - see PHANZEDER SCALE

PHANZEDER SCALE - a scale with a complicated series of parallel links and sub-beams, invented by Phanzeder, Fig 47. Also called a PFITZER SCALE after the Pfitzer Brothers who improved the mechanism. Similar to the Beranger*, except that the legs cross under the main fulcrum.

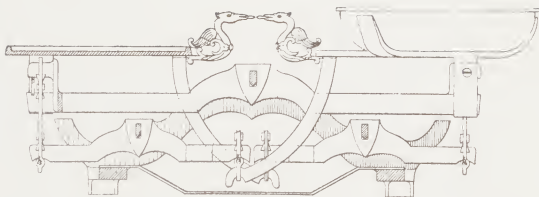


FIG 47. PHANZEDER SCALE

PILLAR - see COLUMN

PIPPIN-STEEL - steel rod shaped in cross-section like an apple pip, or pippin. It was used to make new knife edges* for scale beams. ♡

PIVOT - a knife edge*, pip etc. around which the moving parts of a scale rotate.

PLATE - a flat surface, or receptacle, used on a scale to hold the weights or the goods being weighed, Fig 8. Also called a PLATTER (USA). See also PAN.

PLATE FLEXION - See FLEXURE PIVOT

PLATFORM SCALE - a compound lever scale* with the goods receptacle in the form of a flat platform, typically used in warehouses, factories etc, Figs 14 & 21. Very large types are called WEIGHBRIDGES, and are used for weighing vehicles, rail waggons etc.



FIG 48. POWDER SCALE

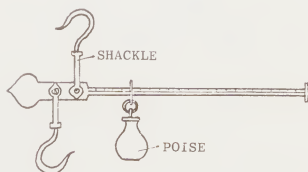


FIG 49. ROMAN STEELYARD

* An explanation of the term marked * appears in the Glossary

PLUG - see STAMPING PLUG

POCKET STEELYARD - a misnomer used to describe a compression spring balance* in the 18th, 19th and 20th centuries. Fig 16 Left.

POINTER - a needle, or form of indicator*, used to show when a scale is level, or to indicate weight on a dial*, Fig 35. Also called a COCK (Old English).

POISE - a sliding or hanging weight used on the beam of a steelyard, Fig 49.

POULTRY SCALE - a scale adapted for weighing live poultry. The bird was placed in a conical receptacle with its head at the narrow end where a hole is provided for the head, Fig 57.

POWDER SCALE - a scale used for weighing gunpowder when making up the charge for cartridges. The powder receptacle was often a narrow scoop for pouring powder directly into the cartridge after weighing, Fig 48.

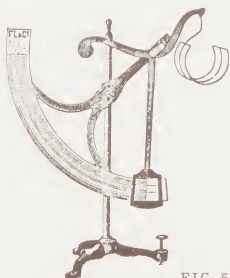


FIG 50. QUADRANT SCALE

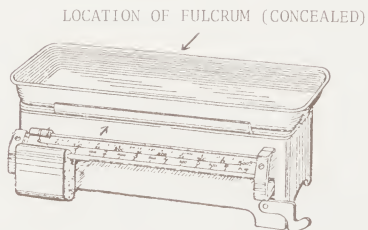


FIG 51. ROCKING-HORSE STEELYARD

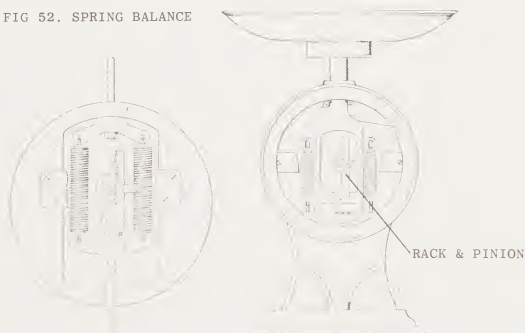
PRECISION BALANCE - a scale constructed for a high degree of sensitivity*. The term covers a range of instruments - Chemical balance, Analytical and Assay balances, Semi-micro balance, and Ultra-micro balance, in ascending order of sensitivity, from about 1 in 100,000 to 1 in 1000,000,000 at maximum capacity*.

PRE-LOADED SCALE - a scale which has one of the pans permanently weighted to a predetermined amount for a specific purpose. e.g. a Hungarian ducat scale*, Fig 24, or some GPO* scales which were pre-loaded to the minimum weight for the current postage rates.

PRESCRIPTION SCALE - a pocket scale used by doctors, apothecaries and patients, for weighing medicines.

* An explanation of the term marked * appears in the Glossary

FIG 52. SPRING BALANCE



QUADRANT SCALE - a scale of the pendulum type* which incorporates a quarter segment of a ring to carry the graduations*. The quadrant may be fixed or may move with the beam, and is used with a pointer*. The name is usually used to describe a paper scale*, Fig 50. There was also a spring balance made by Geo. Salter & Co, registered in 1869, which was called a Quadrant Balance, Fig 56. (N.B. a 1/6 segment is a sextant, and a 1/8 is an octant).

QUANTITY SCALE - see DECIMAL SCALE

R.A. - Recht Abgezogen (German) = properly adjusted. These initials are sometimes found on boxes of coin scales and weights. See also A.G.

RACK-AND-PINION - a toothed rod and gear wheel used to convert linear motion to rotary motion, as used for the pointer* of a dial face spring balance, Fig 52.

RATIO - see LEVER RATIO

READING EDGE - the edge of a poise* which is used as an index* for reading weight graduations. Also called a FIDUCIAL EDGE on old English grain scales.

RELIEVING GEAR - a mechanism which removes all the knife edges* from their bearings to prevent unnecessary wear or damage, Fig 53. Mainly used on precision balances* and platform scales*. See also ARRESTMENT GEAR.

RESISTANT - that part of a scale which counterbalances the load. e.g. weights, a spring, a pendulum weight, sliding poise, liquid, magnet etc.

REVERSIBLE STEELYARD - see TURN-OVER STEELYARD

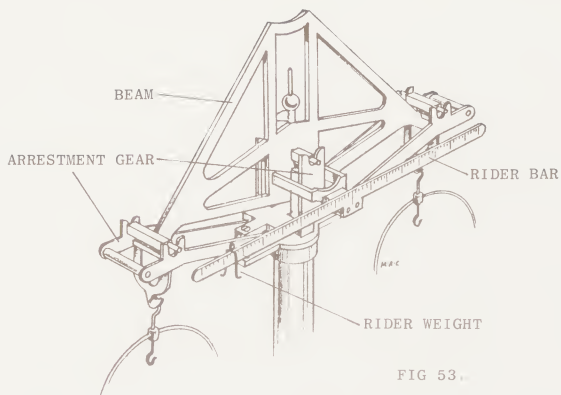


FIG 53.

RIBBON - see BAND

RIDER BAR - a graduated bar attached to the side of a scale beam for use with a small travelling rider weight*. Used on Precision balances*. Fig 53.

RIDER WEIGHT - a minute poise* used on a rider bar* and usually made of bent wire, Fig 53. It is normally moved mechanically from outside the case of the precision balance*, and its use eliminates the need for small loose weights.

RING-AND-HOLE END - a beam end pivot where the ring passes through a hole in the end at 90° to the beam. It was used by the Romans, and by many simple civilisations up to the 20th century, Fig 6 No.3.

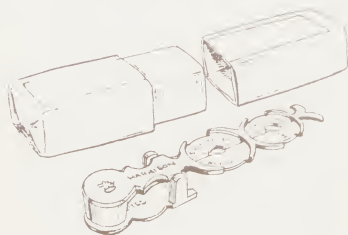


FIG 54. ROCKER BALANCE

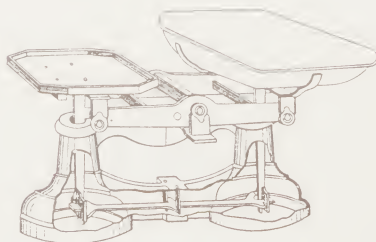


FIG 55. ROBerval SCALE

* An explanation of the term marked * appears in the Glossary

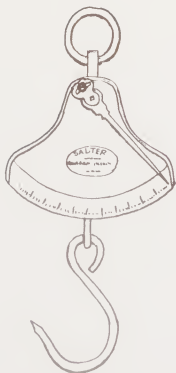


FIG 56. SALTER'S QUADRANT BALANCE



FIG 57. POULTRY SCALE

ROBERVAL SCALE - a scale constructed on the principle invented by Gilles Personne de Roberval. It was first used for scales in the early 19th century. The load and weight plates are above the beam supported by a system of legs* and stays*, thereby eliminating the obstruction caused by the cords or chains on hanging pans, Figs 1 & 55. Also called a STABILISED PAN SCALE (USA). See also INVERTED ROBERVAL SCALE, BERANGER SCALE, PHANZEDER SCALE.

ROCKER BALANCE - a scale on which the load is placed directly on the beam so that it rocks with the beam like a see-saw. The load must be located on the beam exactly, so such a balance is best suited to weighing specific articles of known dimensions, such as coins or eggs. Fig 51.

ROCKING HORSE STEELYARD - a form of steelyard where the beam has arms* almost equal in length, and where the sliding poise* moves along from one arm to the other, passing over the fulcrum*, Fig 51. The advantage of such a system is compactness combined with a small mass required for the poise.

ROD LINKS - rods used to suspend a pan, as an alternative to chains. The rods may be used singly, or linked together in twos, threes or more Fig 7b.

ROMAN STEELYARD - the classical design of steelyard with a hanging poise, Fig 49, often made in the turn-over pattern*.



EQUILIBRIUM

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

WINTER, 1980/81

M. A. CRAWFORTH, EDITOR

PAGES 289-316



PAGE 290



EDITOR'S COMMENT

Interdependence

Most of us have weights in our collection which were bought on their own, singly or in sets, without scales - and very nice they are, too! However, it is most unfortunate that they were removed from their scales. The separation of weights from scales is widespread and has been so, for so many years, that we no longer know, with any certainty, which weights should go with which scales. Worse still, incorrect weights have been put back with some scales, to make a good sale, or 'complete' a collection. The result is misleading evidence and uncertainty about whether weights are original or not.

This deplorable situation is at its worst with the persistent removal of weights from both scale boxes to fill the storage trays of numismatists, a practice which has led to great loss of historical evidence - and the tragedy is that the evidence is lost for all time.

As responsible collectors of an enlightened Society, surely we should make every effort to preserve not only the scales and weights, but also the historical evidence which places them together in their correct context in the past.

Nevertheless, one must accept the situation as it exists and study those weights which have already been separated. Nevertheless, it is the Editorial policy to encourage the study of scales and weights TOGETHER, wherever possible, as the Green Picture of this issue emphasises.



COVER PICTURE

"Handsome Butcher's Vibrating Scale with solid brass back rail". - This apt description of the IMPERIUM scale appeared in the catalogue of W & T. AVERY Ltd in 1908. The marble top was easy for the butcher to clean; it had a brass weight plate, a china goods plate and a sturdy solid case to protect the lever mechanism from dirt and damage. The 20 lb capacity scale cost 120/-, the 10 lb cost 160/- and the 60 lb cost 230/-. A coat of arms is on the goods plate and, originally, the maker's name was on the front in red and gold. The butcher ordered such weights as he desired, but usually, brass bell weights were supplied, comprising 14, 7, 4, 2, 1 lb and 8, 4, 2, 1, ½, ¼ oz for the 20 lb capacity machine illustrated.

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

Bob Stein, President

Michael Crawforth, Vice President

Albert Eaches, Vice President/Treasurer

20 North Wacker Drive, Chicago, IL 60606 U.S.A.

31 Park Lea, Sunderland SR3 3TA England

R.D.3, Box 241, Phoenixville, PA 19460 U.S.A.

© 1981 International Society of Antique Scale Collectors



1001 VARIATIONS

BY L.A. UIT DEN BOOGAARD



There must be alterations in a collection. You have to add things or sell things. You must make some sort of change as otherwise your collection is dead, or ready for a museum !

Your collection will be lively if you add some of the numerous different shapes of weights that I have found in England, or that I have seen being sold at the auctions (held by our Dutch Society), by members who have been to England.

The trade in weights is concentrated in London. Since I started collecting scales and weights made by English manufacturers, I have made several trips from the South to the North of England, and assuredly, searching is tiring work, but the beautiful villages, old towns and landscapes will compensate you for all your trouble and hard work.

Going back to weights: In England, a maker was permitted to make any weights he wished, however strange and however different from the standard ones. In ounces, for instance, you might find $1\frac{1}{2}$ oz, $\frac{2}{3}$ oz, or $3\frac{1}{2}$ oz, or you might find test weights for a special purpose, Fig 5. However, if the weights were used for trade, they had to be the standard denominations, and had to be stamped by the inspector.

You can form a collection of English weights by choosing a certain weight, say 1 lb or 2 lb, and trying to buy every variation you can find in iron, brass, bronze, stainless steel and white metal, Figs 1,2,4,6, and 7. Or you might aim to make up a series of a particular shape, but be warned, it will be extremely difficult. ➤

1



2



3



5



The familiar flat brass weights are a very interesting type to collect, as it is possible to find two hundred year old weights with peculiar marks Figs 7 & 10. George III and IV weights are not rare, and there are many Victorian ones over 150 years old. William IV weights have the London coat of arms, the "coffee-pot" (which is really a ewer), and the year 1826. This date stamp was used for many years after 1826, so do not draw the line exactly.

There are collectors in England now who avidly search for flat weights stamped with the name of the maker, often complete with his address and/or his trade mark, Fig 22. I do so, as it gives much pleasure, and does not cost much money.

BANKER'S WEIGHTS are not difficult to find, as these weights were replaced when England went over to decimal coinage, and when the size of the pound notes was altered, Figs 8 & 9. It seems incomprehensible, in these modern times, that these weights are still in use in every bank, but you can see them while you wait to draw out your money. It seems very peculiar to have weights for 100 x £1 notes. I have my personal opinion about such weighing; I believe that it would not be exact, owing to damaged or repaired notes and so on, but I have not worked in an English bank, and they would know what degree of precision they were obtaining. The purpose of these weights was always stamped on their tops, '£5 silver' or '50p bronze'. I have rows of these weights, and they are all different. (The Weights and Measures Inspector did not stamp them, as they were for internal counting purposes only, not for trade. Ed.).

TROY WEIGHTS were used by bankers, jewellers and apothecaries, starting from 1 oz, and going up to 500 oz, which is a heavy weight ! Fig 11. They were usually made of nice brass. (Troy pounds were prohibited in 1898. Modern sets include decimal parts of a Troy ounce, Ed.).

APOTHECARY WEIGHTS were Troy ounces, drachms and scruples. Many variations are possible, 1,2,4,6,8,10 oz etc, but I have never found a 3,5 or 9oz weight. See Figs 11 & 13.

POSTAL WEIGHTS are a type which will interest most ISASC members, as they all belong to a scale ! Figs 12,14,15,16. Sometimes you will find the postage rate stamped on them, which is useful for dating, if you have the old postage rates available (they are in the ISASC Guide to Weighing Instruments). Collecting postal weights is very interesting because they are beautifully shaped, square, spherical, or tapering, or with rings in the top for lifting, and sometimes marked G.P.O. for the General Post Office.

CASED WEIGHTS are shells of brass, filled with lead, and they are often stamped with the word CASED.

NESTING WEIGHTS were not difficult to find, until recently, but usually they are not complete. Fig 3. You may say that it does not matter if they are incomplete, as you can see incomplete sets in museums, but if you are thinking you will find the missing weights, believe me, that is a fairy tale. When buying, take your time, and check whether they belong together. There are many skillful people who make one set from two incomplete sets, or who supply newly made cups. If fakes are cast, you will see slight marks of the casting. If the









nest rattles, do not buy it, as the cups have to fit nicely. The main proof lies in the weighing, as each bigger cup must weigh the same as all the cups from inside it. Newer nesting sets were made of brass, but older Georgian or Victorian weights were usually bronze.

VICTORIA WEIGHTS were specially shaped to fit in their own stand, round or rectangular, Fig 19. They are rarely found complete, as the small ones get lost.

POTTERY WEIGHTS have gone up in price enormously. Two years ago, I bought a set for £30, but today you would be lucky to buy one weight for that price. Technically, they are no longer weights if their lead has been removed, but they still have ornamental value. If they are not damaged, they look very nice. Usually, they have black printing, but occasionally they have a pretty red or green Wedgwood border. Fig 25.

PROPORTIONAL WEIGHTS for person scales were marked in stones (14 lb), and are hard to find, Fig 20. -those marked in pounds for trade scales are fairly common and made of iron. Figs 20 & 21.

ESTIMATING WEIGHTS were used to estimate the weight of a ream of paper (480, 500 or 516 sheets) from a sample of one sheet. Figs 23 & 24.

From an Article first published in METEN EN WEGEN, the quarterly magazine of the Dutch Society Vereniging van Verzamelaars van Maten en Gewichten.

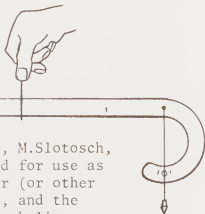
Don pit den Boogaard has a fascinating collection of weights and scales. He has a special interest in Salter spring balances of which he has an impressive display. He has a very active retirement searching for further additions.



PATENTLY INTERESTING



Patent No 280953 of 19 Nov. 1927, M.Slotosch, comprised a walking-stick adapted for use as a weighing instrument. The letter (or other object) was hung from the ferule, and the horizontal was indicated by a plumb-line on the handle. Weight was read off the point of support on graduations on the stick, (bismar).





THE MONIED MAN'S VADE MECUM

Being an Explanation of the Nature,
Structure, and Use of a new Portable
STEELYARD for weighing GOLD COIN.

B.Martin, 1773.

Abstracts and comments by M.A.CRAWFORTH

"Wherein it is demonstrated that this Instrument, in its own nature, results from PRINCIPLES both Philosophical and Mechanical in the most perfect Degree; that therefore its Form is the most Simple and compendious possible; and lastly, that its Use in producing an Equilibrium is more ready, easy and expedite than that of any other Balance whatsoever, as is sufficiently evinced in many different Processes relative to its Application to weighing GOLD¹ both Statically and Hydrostatically; so that its Value is instantly seen to a single Penny and its Weight to Half a Grain."

Benjamin Martin was a famous 18th century instrument maker who worked in London. This ponderous start to his booklet is characteristic of the whole work which includes a little homily on the four cardinal virtues and the place of weighing in society. Martin goes on to explain the mechanical principles of a steelyard in great detail, and then describes his own product :-

"This Steelyard, for such as desire it, will admit of so delicate a Construction, that, the Pennyweights being the Integer, any less Weight may be found in Grains and the 10th Parts of a Grain." "But our present Purpose is to consider its peculiar Apt-ness to produce Dispatch, with all necessary Accuracy, in the Business of Weighing Gold, which is by no Means attainable by the Common Ballance, or Money-Scales, as they are usually called; on Account of the Number of Weights of different Sorts which must be used with them, and which necessarily requires both Time and Computation, as will be seen hereafter; But the Steelyard is an extempore³ Balance, shewing almost instantly the Value of the Money, without any Regard to its Weight at all..."

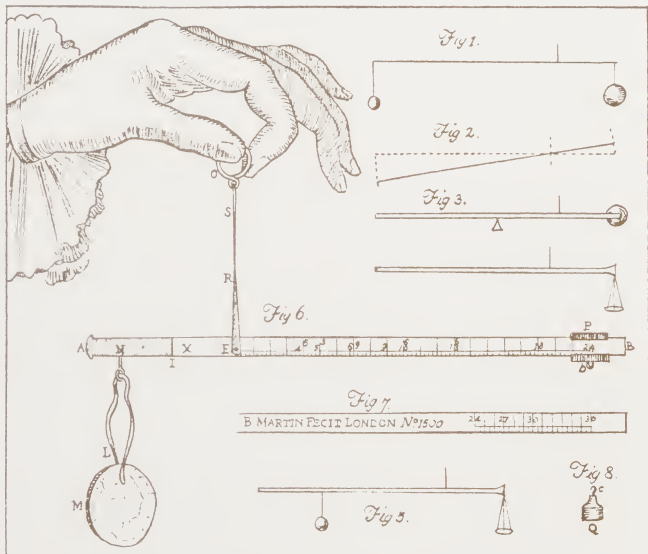
"The Beam AB of the Steelyard is of Ivory, capped at the End A with a Piece of Brass or Silver A₁; this together with the Forceps or Pincers K, make sufficient Weight to ballance the Weight of the Longer Arm EB, when the Beam is suspended by the Silken String ES..." "For thus the Weight of the whole Steelyard is annihilated; and it is now to be considered as a physical Line without Weight." Fig 1.

The sliding weight P and the pincers were also made of brass or silver, to match the capping. A triangular blued steel pointer was fixed to the side of the beam and could be folded flat when not in use. The complete instrument was contained in a slender shagreen cap-end case, Fig 9.

Martin continues by describing how the beam must be divided into 21 equal parts to weigh the guinea "...each divided into Halves by a short Line for Sixpences, and these again into Halves by a line, which will be Three-pences; A Third Part of one of these may be easily ascertained by an Eye in any degree

adroit; and consequently the Value of English Gold may be determined at Sight to a single Penny, or half a grain in weight, which is a much greater Accuracy than you can be assured of by the Generality of Money-scales, especially as they are at this time made."

"After the same Manner the other Side of the Beam ... is divided for weighing Portugal Money to the integer 36s. But as there are only this piece and one more, viz a Moidore, so only the Divisions from 24 to 36 will here be necessary even for weighing Hydrostatically in Water...for all lesser Pieces, as 18s, 13s 6d, 9s, 6s 9d, and 4s 6d are all much better weighed by the Divisions and Weight for English Coin..."



"As the Portugal Money is to be weighed from the same Center N, the Weight P must be increased in the Ratio of 36 to 21 also,...for this purpose the said Weight Q has a small Hook at c to be placed in the eye b on the under part of the Slider P."

One of the advantages of Martin's steelyard was its light weight in the pocket. In later versions he eliminated the second weight by using two alternative suspension points for the load, thus further reducing the weight of the new instrument, (see item seven, below).

"The Steelyard is now compleat... The Manner of using it is next to be shown; which consists in the following Processes." Here, Martin goes on to describe in detail how each of the following can be executed using his new steelyard :-

- "FIRST: To find if a Piece of Gold has its full Standard Value or Weight."
- "SECONDLY: To find if the Piece of Gold has the Value or Weight required to make it current."
- "THIRDLY: To find how much any Piece of Gold is deficient ?"
- "FOURTHLY: To discover the Adulteration of Gold Coin."
- "FIFTHLY: To discover in what Degree Gold is adulterated."
- "SIXTHLY: To ascertain the Degree of Accuracy with which Gold may be weighed by this Instrument."
- "SEVENTHLY: To weigh any Piece of Gold, English or Foreign with one Weight only. That the Weight P may of itself alone weigh any Piece of Gold under 36s, a Second centre X must be found, upon which to suspend the Forceps K; and for that Reason it is made with a fine Spring Wire to go on, or off, from either Center instantly."
- "EIGHTHLY: To render this Steelyard universally useful in weighing the Gold Coin of every Country, nothing more is necessary than a General TABLE of such GOLD COINS, which I have therefore here annexed."
(See page 310).
- "NINTHLY: To find the Weight of any Body under an Ounce Troy, by the Steelyard, in 1000 Parts of a Grain."



FIG 9.

"To conclude, the Advantage and Conveniency of these Money Steelyards has been sufficiently attested by the most rapid Sale of them ever since the First Day they were offered to the Public, ...and which is like to continue for some time; for though many Persons have been tempted on that Account to pirate them, yet, on the one hand, so clumsy and inartificial were these Counterfeits, ...that the Sale of these Steelyards (Martin's) was rather advanced than diminished by such disingenuous^s and illiberal Attempts. Nay even with respect to

Money Scales themselves, there are many Particulars in which they must acknowledge Preference to the STEELYARD, For (1) In the Use of Scales there are a Multitude of Money Weights, Water Weights, Pennyweights, and Grain Weights; whereas in the Steelyard, one Weight only suffices; ... (2) The Extempore Use of the Steelyard far exceeds that of the Balance, as every one finds true by Experience. (3) The Steelyard goes in a small Compass,⁶ and is most easily Portable; the Balance from its Bulk and Weight can have but awkward Pretence to this Prerogative. (4) The Weights alone, in a single Set of each for the Balance, amount to more than 53 Pennyweights, besides the Weight of the Beam, Scales and Case; and therefore cannot be sent to any Place by the Post; but the Steelyard may be sent in a Frank,⁷ as none weigh more than an ounce, and some not more than 14 or 15 Pennyweights. (5) The truth and accuracy of shop - Balances, in general, is not at any time very extraordinary; much less can they be expected so now, when they are hurried off with the utmost precipitancy and confusion; But with respect to the Steelyards, they are all adjusted with the utmost care by one Standard, and authenticated Weight. Therefore (6) since in the Money Balance there are no less than 33 different Weights that must be adjusted singly (viz. 10 Money Weights, 10 Water Weights, 6 Penny-weights, and 7 Grain Weight Pieces, exclusive of 36s Port) and in the Steelyard one Weight only being adjusted and verified, makes the Instrument true for all the Rest, it is easy to infer that if the Merits of the Common Money Scales and Steelyard were to be weighed in Astraea's⁸ Balance, that of the Steelyard would greatly preponderate. (7) Lastly, the finest Money Scales moving on an Axis must have some Quantity of Friction, whereas, the Steelyard moving only on the End of a fine Silk Cord, cannot well be conceived to have any Friction at all, and therefore its Freedom of Motion the greatest that possibly can be. FINIS."

Of course, Martin used the traditional means of enhancing his own product by emphasising the worst features of his competitor's scales, whether imagined or not. Common balances were not all of poor quality, as he suggests, many were beautifully made and very sensitive. The author has several scales from the 1770's which, even now after 200 years, will turn to less than a quarter of a grain. Martin's reference to poor quality balances at the time of writing was prompted by the great increase in public demand for money scales in response to the Act of Parliament in 1773, which required the tellers of the Exchequer, (and which permitted everyone else), to cut and deface any gold coin which had been diminished in weight otherwise than by reasonable wear.

Very few sets of scales had the full 33 weights which Martin describes, for hydrostatic weighing, although it is true that to equal the claimed facilities of Martin's steelyard, they would have been needed. Such sets appear to be as rare, now, as Martin's steelyards ! The preponderance of conventional money scales with a handful of weights suggests that the public did not want, or could not afford, the more elaborate sets.

It is interesting to examine the weights mentioned. Martin expected people to need facilities to weigh the Moidore and its subdivisions, 27s, 13s 6d, and 6s 9d, the Portuguese piece and its subdivisions, 36s, 18s, 9s, and 4s 6d, and those for the Guinea, 21s, 10s 6d and 5s 3d. These are the normal weights of the period, so, it is strange that Martin remarks "exclusive of the 36s Port" Weights for the above coins, including the 36s, add up to the ten mentioned by Martin, so perhaps his comment should have been 'exclusive of the 72s Port'.

There would have been water weights for each of the above coins, and the 7 grain weights mentioned were, presumably, 6,5,4,3,2,2, and 1. i.e. a total of twenty-three grains, one grain short of a pennyweight. This is a logical sequence, but the full seven are seldom found in surviving sets, (the second 2 is rarely included). The 6 pennyweights mentioned by Martin would have been 6,5,4,3,2 and 1, which have often survived to the present day.

The light weight of the steelyard must have been an advantage to the dandy concerned with preventing his pockets bulging, but was Martin's claim for greater accuracy justified ? In recent times, the Weights and Measures Regulations allowed errors for trader's steelyards of sixty times those permitted for trader's equal-arm beams with hanging pans. For obvious reasons, Benjamin Martin did not point out that if an error did occur in his steelyard weight, the error was multiplied by the lever ratio of the steelyard, and that proportional errors would apply to all values of coins.

In the 18th century, the flexing of a fine silk cord must certainly have seemed to be without friction, but today, we know that friction does occur between the fibres and between the molecules which make up the fibres. The main disadvantage of cord is that unless it is a very tight fit in the hole in the beam, the point of suspension will vary and cause errors in weighing. It would be almost impossible to thread a cord through a hole tight enough to prevent this fault.

Benjamin Martin's booklet is a fascinating illustration of the circumlocution, and thoroughness, of his time. It contains useful evidence for research into weighing money and evidence about the scales and weights used. The author has seen several surviving examples of Martin's steelyards, with serial numbers ranging from 2 to 4840. Three incomplete ones may be seen in the Museum of the History of Science, in Oxford.

NOTES: In the period since Benjamin Martin wrote his booklet several words have changed their meaning, and others had a specialized meaning :-

1. GOLD - it was common to refer to gold coins simply as 'gold'.
2. INTEGER - whole number.
3. EXTEMPORE - without study or forethought.
4. INARTIFICIAL - not according to the rules of the art.
5. DISINGENUOUS - unfair.
6. COMPASS - limits, confined space.
7. FRANK - free postage for Members of Parliament, limited to letters or packages up to 2oz in weight.
8. ASTRAEA - Greek goddess (Starry Maid) who carried scales and is identified with Dike and Justice.

Benjamin Martin was born in 1714 and started his workshop in 1744. His son became a partner in the business in 1780, but shortly afterwards Benjamin was declared bankrupt, and he died a few months later in 1782.



OLD PRINTS

Engravings by Christoff Weigel 1698, from a set of 212 under the title
'Illustrations of the Useful Professions of all Artists and Craftsmen'.

Illustrations supplied by Dirk Schmitz.

Translation by Carl Mönning.

*Der Gewichtmacher.
Gerechtigkeit soll schenken, aus Großen und aus Kleinen*



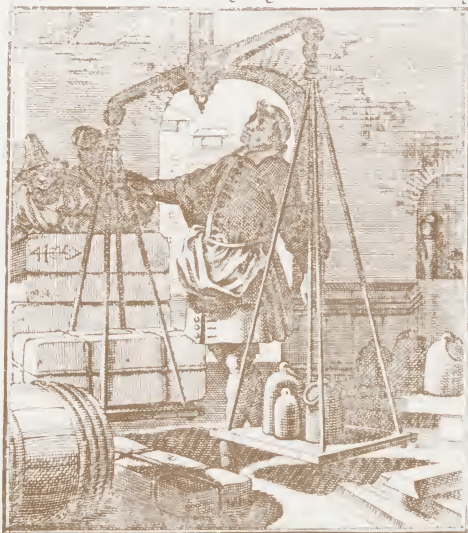
*Die Schwere und Leichtigkeit der Sachen
prüft und erforschet das Gewicht;
doch diesen Unterschied will nicht
Die Welt, bei Wahl der Leute machen.
Das Geld allein kann den erheben,
der sonst niedrig bliebe stehen.*

THE WEIGHT MAKER

Justice shall be in all Things, both Great and Small.

Weights test and explore the heaviness and lightness of things.
But the World will not test people thus.
Only money raises a person above his merit.

Der Waagmeister.
Waget wohl der Verkeins-Waag Dinnand-Eilack in-Kastler-Platz



*Der Wahrheit muß geheiligt seyn
 Die Freundschafts-Zung in allen Sachen
 und keinen falschen Ausschlag machen
 wo Recht und Treu gilt allein.
 Dann so kan man die Feuchler seihen
 wann sie den Fehler Dingen nennen*

THE WEIGHMASTER

The Heart is the Scale which Weighs Good and Evil.

*The pointer of friendship should be sacred
 To the truth in all things and shall not make a wrong turn
 Where only right and faith have value.
 Thus dissemblers are at once discovered
 When they call a fault a virtue.*



NOTES & QUERIES

NQ 46. NOT GLASS WEIGHTS (NQ 37)

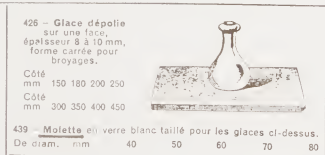
reply from Y.Noël

I am confident of my identification of the glass objects, but Mr. Lindayer may be disappointed in the answer. They are not glass weights, but are a special type of pestle (with a flat base), which were used by chemists for grinding solid particles on a flat slab. Normally (and anyway, after use), the lower surface is dull.

Classically, in France, this type of pestle was called a 'molette' (which meant small 'meule', or millstone - compare with the word molar, for tooth). The slab was called a 'porphyre' (even if made of glass), hence pulverisation was sometimes called porphyrisation.

These things are now obsolete and the words are almost forgotten, but some twenty-five years ago these pieces of chemical equipment could still be purchased. Here is an illustration from a catalogue of that time :

Établissements **LEUNE**, 28 bis, Rue du Cardinal Lemoine, Paris-V*



As can be seen, the 'molettes' were described by diameter, not by weight. I possess one, base diameter 54mm (weight 648gram).

Although Mr. Lindayer's set is not, I think, one of rare unusual and valuable glass weights, it is, nevertheless, one of very nice old pieces of labware.

NQ 47. WEIGHTS MARKED 'T'

query from R.Rix.

I bought, in England, a complete set of round postal weights in a wooden box. The following weights are included; 4, 1, 1, 1, 1 oz, 2 dram, 1 gr. all marked GPO and in addition, the mark T. Does this mean 'Test weight' as explained to me when I bought them?

REPLY

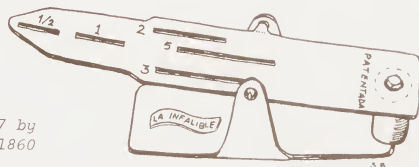
from the GPO

According to GPO records, a set of round brass weights 4, 2, 1, 1, 1 oz was supplied to the Post Office Surveying Staff (inspectors) and to Postmasters, for use in testing scales and weights used in Post Offices. They were known as 'Test Weights', and were first supplied in 1906. (The GPO did not comment on the stamp T, but it seems likely that test weights would have been marked to distinguish them from weights in daily use. - Editor).

A SPANISH PATENT of 1860

BY S.BERASTEGUI

In Spain, one nearly always meets coin scales of the equal-arm type. All are very similar, apart from differences in the weights, boxes and materials. However, in our search for more information about coin scales we decided to do research in the Spanish Patent Office. There we found a patent for a counterfeit coin detector of the rocker type, which appeared in the very latest period for weighing money.



Patent No. 1887 by
Kelman Treff. 1860

With this balance, it was possible to test silver coins from the end of the 19th century and the beginning of the 20th century; five pesetas (1 duro), three pesetas, two pesetas, one peseta and half-peseta (2 reales). Curiously, a three peseta coin did not exist in Spain, but we have found that the size and weight of this coin coincided with the 50 centavos (1 peso) used in the Spanish colonies. According to the weight of the 50 centavos, its value should have been two and a half pesetas, but perhaps it had gained the value of three pesetas, when the scale was made.

At the time these silver coins were current, there were also some gold coins in circulation, but they were beginning to disappear, and with them, the interest in coin weights was declining. For this reason, we think that this patent rocker was probably the last of the Spanish coin scales. Certainly, it was the only Spanish coin scale of the rocker type, and the only coin scale to be patented in Spain.

It was patented by Kelman Treff of Barcelona, and was similar to rocker No.4 in A Guide to Weighing Instruments (by M.A.Crawforth, ISASC Publ.). We were lucky to find an example last year. It is nickel plated iron, 130mm long, and marked on the base, LA INFALIBLE.

Sue Berastegui specialises in collecting Spanish coin scales, of which she has a good selection. She, and her husband Pedro, are currently researching weight marks and makers in Spain.

Tongue-tied?

Do not worry if English is not your best subject! The idea is the important thing. Send your idea or article and the Editor will "tidy-up" the English (and try to supply illustrations if needed).



Symposium '79

PAPER PRESENTED
BY J.L.MALTER

COLLECTING ANCIENT WEIGHTS

Undoubtedly, the attraction of collecting ancient weights is that they were made in a wonderful variety of shapes. Unlike modern weights, which are rigidly geometric, ancient weights were sometimes in the form of animals.

We all know that scales and weights preceeded the invention of coinage by at least two thousand years. The earliest scales were simple balances, so the item to be weighed was placed on one pan, and weights of known value on the other, until equilibrium was obtained. Then the weights would be read to establish the value of the item.

Stone was one of the first frequently used weight materials. Different civilisations used different kinds of stone, and shaped and inscribed in for use. Obviously, certain standards were developed for fractions and multiples of the basic weight.

The famous shekel weights of ancient Judea were usually limestone, dome-shaped on top and flattened on the bottom. With the value scratched on. A one shekel weight is shown in Fig 3.

In the period before coinage, the world's commerce was based on barter. Thus, because food was the most important staple, it was logical that weights often had animal forms. The Babylonian weights shown in Fig 2, are shekel weights in the form of trussed ducks, and at the period of these weights - about 600 AD - weighed about 12 grams. They were nearly always made from a hard black stone called haemetite. However, the more common Babylonian weights were shaped like cylinders or barrels, Fig 4, and the most common Egyptian weights were made of a granite-like stone and shaped like cup-cakes.



FIG 1. Egyptian falcon weight believed to be a tare weight for scales.



FIG 2.



FIG 3.



FIG 4.

These ancient weights are challenging to collect because the main test of their authenticity, assuming one is familiar with the patina that forms on very old man-worked stones, is to check the actual weight of the weights. We know the various standards for different areas at different times (from the excellent reference books available). Thus, a shekel weight of 14 grams may be from, say, the city-state of Ninevah in the 9th century BC, while a shekel weight of 12 grams might come from the city of Babylon in the 7th century BC.

Other civilisations used weights of very different materials from stone. In Mesopotamia, bronze weights were used at a very early period, concurrently with stone weights. The Greeks employed lead weights almost exclusively, and some were very novel. A full mina weight from Aegina showed a turtle in relief, and a half-mina was half the size and showed half a turtle, Fig 5.



FIG 5.



FIG 6.



FIG 7.

Although the Romans used stone weights in the Early Republic, bronze was the common material for centuries. Very late in the Roman-Byzantine period glass weights were introduced, and were used extensively in the Islamic world, Fig 6.

The weight in Fig 7, was used in a Greek city under Roman domination during the rule of Antonius Pius, 138-160 AD. There are six sides to the weight, including the four edges, and each side has an inscription giving the titles of the Emperor in Greek. The piece weighs 15 grams exactly, and was probably balanced against the dupondius coin.



FIG 8.

Some people get confused between animal weights and animal amulets, but it is relatively simple to differentiate them, as amulets usually have loops for wearing, whereas weights are generally flattened on one side, so that they would not roll off the scale pan. Animal weights would not have loops, normally, although large late Roman and Byzantine weights did have rings for use on steelyards.

Among ancient weights that have survived are bronze cows, lions, bees, stone frogs, turtles and scorpions, Fig 8, all of which are very interesting to the weight collector. >

ANCIENT WEIGHTS - SELECT BIBLIOGRAPHY

- BALOG. Paul; Ummayad, Abbasid and Tulunid Glass Weights and Vessel Stamps. New York 1976.
- BARKAY. Gabriel; Catalog des Poids Byzantins; Musee d'Art et Histoire de Geneve, Vol xii 1964.
- LANG. Mable and Margaret CROSBY; Weights, Measures and Tokens, The Athenian Agora, Vol X. Princeton, NJ 1964.
- LANG. Mable; Five Hellenistic Weights. Museum Notes No.14 pp 1-3. American Numismatic Society, New York, 1968.
- PETRIE. Sir William; Glass Stamps and Weights, Ancient Weights and Measures. London, 1974.
- SCOTT. R.B.Y, The Shekel Sign on Stone Weights. Bulletin of the American Schools of Oriental Research, No.153, Feb 1959.

(Mr) Maltby's passion in life was collecting ancient coins and books about coins. Now his interests have broadened to include ancient art objects of all kinds, including weights, and he now runs a successful business buying and selling these items.

TABLE of GOLD COIN.

	S.	d.	den.	p.
A Guinea	21	0	5	9
$\frac{1}{2}$ Ditto	10	6	2	10
$\frac{1}{4}$ Ditto	5	3	1	8
French Louis d'Or, old	16	9.3	4	8
The New Louis d'Or	20	0.6	5	5 $\frac{1}{2}$
Spanish Pistole	16	0.3	4	8
A Portugal Piastre	72	0	18	11
$\frac{1}{2}$ Ditto	36	0	9	5 $\frac{1}{2}$
$\frac{1}{4}$ Ditto	18	0	4	14 $\frac{1}{2}$
$\frac{1}{8}$ Ditto	9	0	2	7 $\frac{1}{2}$
$\frac{1}{16}$ Ditto	4	0	1	3 $\frac{1}{2}$
Spanish Doubloon	65	0	17	8
Minea d'Ore, or MOIDORE	27	0	6	22
$\frac{1}{2}$ Ditto	13	6	3	11
$\frac{1}{4}$ Ditto	6	9	1	17 $\frac{1}{2}$
Old Italian PISTOLE	16	7.6	4	6 $\frac{1}{2}$
Present PISTOLE of Rome, Milan, Venice, &c.	16	6.7	4	6 $\frac{1}{2}$
DUCAT of Genoa, Venice, Florence, &c.	9	3.8	2	5 $\frac{1}{2}$
Flemish IMPERIAL	11	9	—	—
DUCAT of Bamberg and Brandenburg	9	3.2	2	5 $\frac{1}{4}$
DUCAT of Hanover	9	2.7	2	5 $\frac{1}{2}$
DUCAT of Hungary	9	3.6	2	5 $\frac{1}{2}$
DUCAT of Poland	9	2.1	2	5
DUCAT of Transylvania	8	11.6	2	4 $\frac{1}{2}$
The Sequin or Chequin of Venice	9	5.7	2	5 $\frac{1}{2}$
DUCAT of Barbary	9	3.5	2	6
DUCAT of Constantinople of Muscovy	9	6	—	—
RUPPEE in India	31	6	—	—
PAGODA, on the Cochin and Ceylon	5	0	—	—
Sultani, Xerif, or Chepman, in Turkey	9	5	—	—

BLAND. MARTIN'S
TABLE OF GOLD
COINS.

See page 501.

GLOSSARY OF TERMS CONTINUED

SADDLE - a pad or carriage carrying a knife-edge* and arranged to slide along a beam in order to adjust the leverage. Also called a **NOSE IRON** (USA). Although normally used as a term for weighing machine parts, the term may be used to describe the carriage carrying the fulcrum* of certain steelyards* and bismars*. Fig 9b. See also **SLIDING BEAM STEELYARD**.

SCALE (1), SCALES, A PAIR OF SCALES - names for a weighing instrument, said to be derived from the old Norwegian SKÅL, meaning a bowl. Strictly speaking, a scale is a pan and it was used in this sense until the 20th century, hence the term "pair of scales" for a balance with two hanging pans.

SCALE (2) - a series of graduations*. It is strongly recommended that this term is NOT used, to avoid confusion. Instead, the terms **GRADUATIONS, DIVISIONS, CHART OR QUADRANT** should be used.

SCHICKERT SCALE - see **MASS STABILISED PAN SCALE**

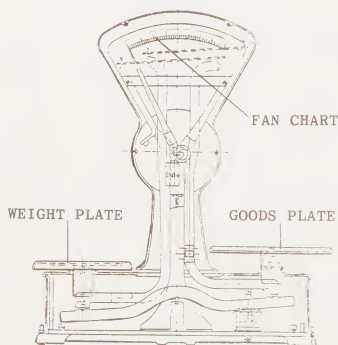


FIG 58 SEMI-SELF INDICATING SCALE

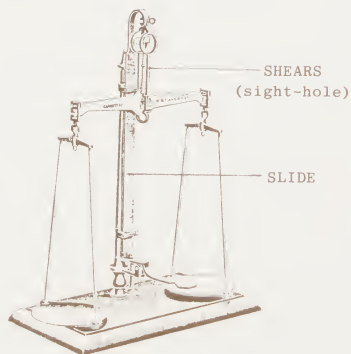


FIG 59

SCOOP - a deep receptacle of oval or egg shape used for weighing and pouring-out loose goods, powders etc. Figs 19 & 25.

SEAL - see **VERIFICATION MARK**

SECTOR SPRING BALANCE - see **'V' SPRING BALANCE**

SELF-INDICATING SCALE - a scale which indicates the weight of a load automatically, e.g. a spring balance, pendulum balance, Fig 25. See also **SEMI-SELF INDICATING SCALE**.

SEMI-SELF INDICATING SCALE - a scale which indicates part of the load automatically, leaving the remainder to be balanced manually by loose weights, or a sliding poise*. Fig 58.

SEMI-ROBERVAL - see HALF-ROBERVAL.

SENSIBILITY - see SENSITIVITY.

SENSITIVITY - the smallest weight which will cause sensible movement of a scale beam. The sensitivity usually varies with the load and it is necessary to state the load at which the sensitivity occurs. Also called SENSIBILITY or SENSITIVENESS.

SHEAR - a forked bracket containing bearings and used to suspend beams, pans, hooks etc. or for connecting parts of a scale lever system. Fig 49. See also SHEARS.

SHAGREEN - a substance used to cover the boxes for some English coin scales in the 18th century. Said to be made from the skin of the dogfish, or made from untanned leather with a deep granular surface formed by pressing seeds into the surface. Shagreen scale boxes are usually black, but the surface may be polished flat and dyed green or red. Also called SHARKSKIN or FISHSKIN.

SINGLE LEVER - a beam and patented by Patrick Sharkey of Liverpool, in 1853. Weights and poises are protected in a box-like cover called an AMATE BOX. Fig 60. No. 24.

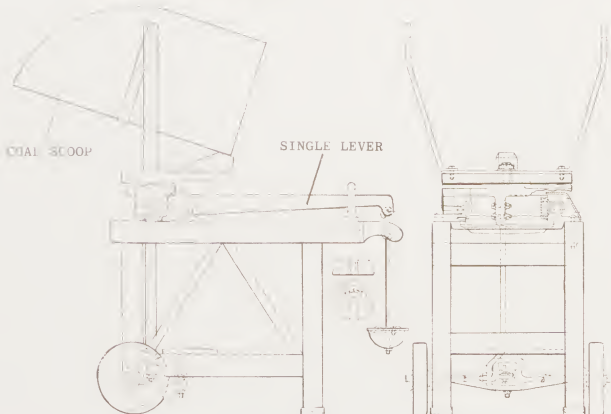


FIG 60 SINGLE LEVER MACHINE

SHARKSKIN - see SHAGREEN

SHEARS - a forked, or two-legged structure carrying the main bearings for the fulcrum* of a scale beam, and which is used to suspend the scales, Fig 59. Also called CHEEKS, FORKS or GALLOWS. See also SHACKLE, SIGHT-HOLE SHEARS.

SHELF-EDGE SCALE - a scale which requires the use of a shelf or table edge to support the pivots and to act as a bearing surface. The load is suspended over the edge of the shelf. Patented in England by Hulls and Bradford in 1753. A letter version is shown in Fig 9b.

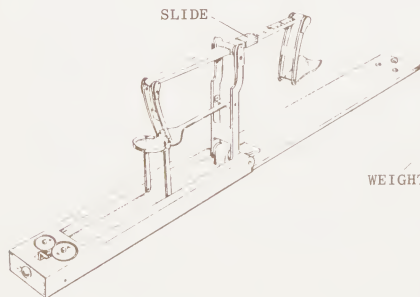


FIG 61. FOLDING GOLD BALANCE.

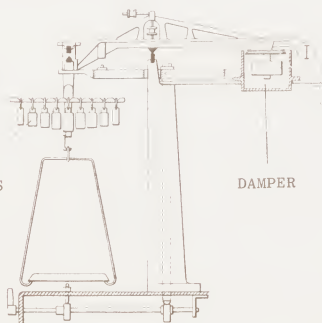


FIG 62 SUBSTITUTION BALANCE

S-HOOK - a hook shaped like a letter 'S' used to suspend scales, loads etc. Fig 67. See also S-LOOP.

SIDE BEAM - see TARE BAR.

SIGHT-HOLE SHEARS - shears with a hole in the legs through which the pointer* can be seen, or sighted. Fig 13.

SINGLE LEVER MACHINE - a scale which uses an unequal-arm beam*, or a loose-weight steelyard*, with a load receptacle above the beam. The receptacle is stabilised by a leg* and stay*. Fig 60.

SLIDE (1) - a flat pillar with a curved top loosely attached to a column* and from which a scale is suspended. The slide is lifted by a lever or key*, to raise the scales into the weighing position, Fig 59.

SLIDE (2) - a sliding poise* used on folding gold balances*, Fig 61.

** An explanation of the term marked * appears in the Glossary*

SLIDING BEAM STEELYARD - a steelyard on which the main fulcrum* and load shackle* are carried on a saddle*. The beam is also part of the weight and it slides through the saddle. The position of the beam indicates the weight of the load, Fig 66. See also TELESCOPIC STEELYARD.

S-LOOP - a wire loop shaped like a closed letter 'S' used to suspend scales, pans, hanging poise etc. Fig 6. See also S-HOOK.



FIG 63 SLOTTED WEIGHTS

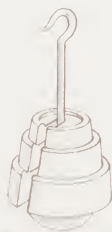


FIG 64 SPECIFIC GRAVITY BALANCE

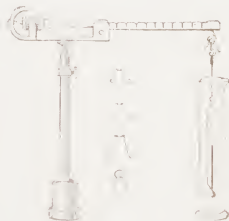


FIG 65 STACKING WEIGHTS

SLOTTED WEIGHT - a weight with a slot formed in it which is designed to fit over a single hanger* rod. Usually, they are proportional weights for use with a loose-weight steelyard*, Fig 63.

SLOW - a scale is said to be 'slow' when the weight indicated is lower than the true weight. Normally a term used for dial or fan scale*. See also FAST.

SPECIFIC GRAVITY BALANCE - a scale designed for determining the specific gravity of substances by comparing the weight in air with the weight in water. The specific gravity of liquids is determined by weighing a standard solid body in water and then in the liquid. Balances may take various forms, one of which is shown in Fig 64.

SPREADER - a three or four legged support for a pan* or scoop*. The legs are longer and more curved than a cross*, Fig 25.

SPRING BALANCE - a scale which uses a spring resistant* to balance the load, instead of weights. The spring may work in tension or compression and can take a variety of forms: a coil, a 'C', a 'V', an ellipse, a lyre, flat etc, etc.

STACKING WEIGHTS - weights which rest on top of each other in descending order of weight and located by a shallow rim around the top of each weight, Fig 65. Also called TELESCOPE WEIGHTS and sometimes referred to in old manufacturer's catalogues as NEST WEIGHTS. It is recommended that the latter term is NOT used.

STAMP - see VERIFICATION MARK.

STAMPING PLUG - a soft metal plug, usually lead, fixed into a hole in weights and scales, to receive the verification mark*.

STAND SCALE - a scale suspended from a column* attached to a base, Figs 70 & 71.

STANDARD WEIGHT - a weight used as a reference for checking other weights or scales.

STAY - a bar connecting the bottom of the leg* to the lower centre pivot in a Roberval scale*, or any similar application, Fig. 2 & 30. Also called a CHECK (USA), or an OVERHEAD CHECK on an inverted Roberval scale* (USA).

STEELYARD - an unequal-arm beam with a fixed fulcrum and a sliding or hanging poise* by which means the load is balanced, Figs 10 & 40. Also called a STILLIARD, STILLION, (old English) and several other names, or a BEAM SCALE (USA). See also ROMAN STEELYARD, SLIDING BEAM STEELYARD, TELESCOPIC STEELYARD.

STEM - see LEG.

STIRRUP END - a beam end suspension component shaped like a stirrup, with a single bearing*. A continuous knife edge* is used with it, Fig. 6 No. 25.

FIG 66 SLIDING BEAM STEELYARD

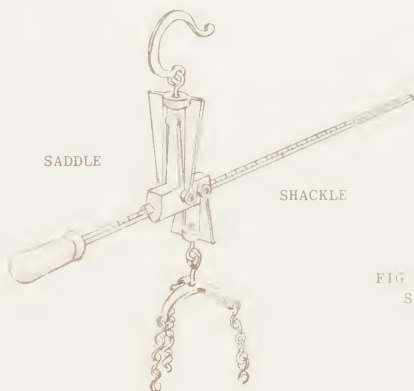


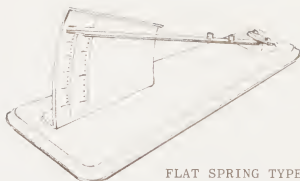
FIG 67 STRAIGHT-FACE
SPRING BALANCE



* An explanation of the term marked * appears in the Glossary



SUBSTITUTION TYPE



FLAT SPRING TYPE

FIG 68 STYLUS BALANCES

STRAIGHT-FACE SPRING BALANCE - a spring balance with the pointer* attached directly to the end of the spring, and which registers the extension of the spring (weight) on a straight graduated face, Fig 87.

STYLUS BALANCE - a device used for measuring the force applied to a record by the stylus of a record player. As the player arm is supported at one end by its pivot, the stylus balance does not measure the weight, it only measures part of the weight. So, although closely allied to balances it is not a true scale.

SUBSTITUTION BALANCE - a scale on which the weights are carried on the load arm of the beam counterbalanced by a dead mass on the other arm of the beam. The mass is fixed to the beam, so there are only two knife edges, Fig 62. When the load is placed in the pan, weights are removed to restore balance. The sum total of the weights removed equals the weight of the load. Also called a **CONSTANT LOAD BALANCE**, or a **TWO-KNIFE BALANCE**. See also **SUBSTITUTION WEIGHING**.

SUBSTITUTION WEIGHING - the load to be weighed is placed on one scale pan and balanced with any suitable loose material on the other pan. The load is then removed and proper weights are substituted for the load, until equilibrium is restored. The total of the weights is the weight of the load. Also called **BORDA WEIGHING** after the French scientist Jean Charles de Borda (1733-1799).

SUSPENSION RING, or LOOP - a ring of wire attached to the top of the shears* or top of a spring balance etc, used to suspend the instrument. Fig 44.

SWAN-NECK END - a beam end curved over like the neck of a swan. The turned down end has a hole filed into a rudimentary form of knife edge. A steel ring or S-loop* is passed through the hole and is used for the attachment of cords or chains, Fig 6 Nos. 7 to 10. See also **INVERTED SWAN-NECK END**.

* An explanation of the term marked * appears in the Glossary